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PROJECT COMPLETION REPORT

KOREA

SEVENTH RAILWAY PROJECT (LOAN 1836-KO)

May 16, 1986

Projects Department
East Asia and Pacific Regional Office

THE WORLD BANK
Washington, D.C. 20433
U.S.A.

Office of Director-General
Operations Evaluation

May 16, 1986

MEMORANDUM TO THE EXECUTIVE DIRECTORS AND THE PRESIDENT

SUBJECT: Project Completion Report on Korea Seventh Railway Project (Loan 1836-KO)

Attached, for information, is a copy of a report entitled "Project Completion Report on Korea Seventh Railway Project (Loan 1836-KO)" prepared by the East Asia and Pacific Regional Office. Under the modified system for project performance auditing, further evaluation of this project by the Operations Evaluation Department has not been made.

Attachment

KOREA

SEVENTH RAILWAY PROJECT (LOAN 1836-KO)

PROJECT COMPLETION REPORT

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SEVENTH RAILWAY PROJECT (LOAN 1836-KO)

PROJECT COMPLETION REPORT

Preface

This is a Project Completion Report (PCR) for the Seventh Railway Project for which Loan 1836-KO was approved in April 1980 for the sum of US$94.0 million.

The PCR was prepared by the East Asia and Pacific Transportation I Division, based upon a review of the project files and data supplied in August 1984 by the Korean National Railways. Bank staff who worked on the project have also been interviewed.

The loan closing date was December 31, 1984.

In accordance with the revised project performance reporting procedures this report has been read in the Operations Evaluation Department (OED) but the project was not audited by OED staff. The draft Completion Report was sent to the Borrower for comments. Comments received are shown as an annex to the report.

PROJECT COMPLETION REPORT BASIC DATA SHEET

KOREA - SEVENTH RAILWAY PROJECT - (LOAN 1836-KO)

KEY PROJECT DATA

	Appraisal	Actual
Total Project Cost (US$ million)	366.9/a	410.8
Overrun (%)	-	12
Loan amount (US$ million)	94.0	-
Disbursed)	94.0	93.0
Cancelled)	-	1.0
Repaid as of) Jan 15, 1985	3.6	3.6
Outstanding as of) Jan 15, 1985	90.4	88.6
Date Physical Components completed	06/30/83	12/31/84
Proportion Completed by Above Date (%)	-	98
Proportion of Time Overrun (%)	-	40
Economic Rate of Return (%)	22	15
Financial Performance	Good	Average
Institutional Performance	Good	Good

OTHER PROJECT DATA

Item	Original Plan	Revisions	Actual or Est. Actual
First Mention in Files	12/22/78	/ /	12/22/78
Negotiations	03/17/80	/ /	03/17/80
Board Approval	04/29/80	/ /	04/29/80
Loan Agreement Date	05/21/80	/ /	05/21/80
Effectiveness Date	08/29/80	/ /	08/29/80
Closing Date	12/31/83	12/31/84	12/31/84

Borrower	Republic of Korea
Executing Agency	Korean National Railways (KNR)
Fiscal Year of Borrower	January 1 - December 31
Follow-on Project Name	Coal & Cement Distribution Project
Loan Number	L-2267-KO
Amount (US$ million)	122.0
Loan Agreement Date	04/29/83

MISSION DATA

Item	Month, Year	No. of Weeks	No. of Persons	Man-weeks	Date of Report
Identification	11/78	0.5/b	3	1.5	12/22/78
Preparation					/ /
Preappraisal	05/79	1.0/b	3	3.0	06/27/79
Appraisal	09/79	2.5	3	7.5	10/17/79
Total		4.0		12.0	
Supervision 1	07/80	0.5/b	2	1.5	08/07/80
Supervision 2	04/81	0.5/b	3	1.5	06/05/81
Supervision 3	02/82	0.3/b	3	0.9	03/26/82
Supervision 4	10/83	1.0/c	1	1.0	11/23/83
Supervision 5	09/84	1.0/d	3	3.0	10/15/84
Total		3.3		7.4	

COUNTRY EXCHANGE RATES

Name of Currency (abbreviation)		Won	(W)
Year:			
Appraisal Year Average	1979	Exchange Rate: US$1 =	W 485
Intervening Years Average	1980-83	US$1 =	W 691
Completion Year	1984	US$1 =	W 800
Average	1979/84	US$1 =	W 675

/a As reduced from original estimate (US$604.3 million).
/b Originally including supervision of Sixth Railway Project, but now adjusted for this project only.
/c Supervision of financial performance only.
/d Originally including supervision of coal and cement project, but now adjusted for this project only.

KOREA

SEVENTH RAILWAY PROJECT (LOAN 1836-KO)

PROJECT COMPLETION REPORT

Highlights

i. The Seventh Railway Project continued the Bank's assistance to the Government of Korea in improving its transportation network. The project was designed to meet increasing passenger and freight transport volumes and also to strengthen the Korean National Railways (KNR) as an institution and prepare it for full autonomy by January 1, 1987.

ii. The project achieved most of its objectives despite several delays and reductions in the investment plan. KNR successfully and efficiently executed all civil works. The commercial accounting, costing, marketing and management information systems implemented under the project had a significant effect on KNR as an institution. These were not the only institution building achievements, since a start was made under the project on introducing a management improvement program. In addition, extensive urban, regional and corridor multimodal transport studies have led to significant improvements in transport planning in Korea as well as the identification of viable new investment opportunities. Finally, due to lower than expected traffic growth and government tariff policies, the economic and financial returns were not as high as expected.

iii. The outstanding feature of this project is its extensive institution building and the development of a more market-oriented KNR. Also, the landmark transport studies carried out mainly by local consultants in joint ventures with foreign firms have significantly helped to build Korean consulting firms and introduce a multimodal approach to transport planning.

KOREA

SEVENTH RAILWAY PROJECT (LOAN 1836-KO)

PROJECT COMPLETION REPORT

I. PROJECT BACKGROUND AND SECTORAL SETTING

The Transport Sector

1.01 Korea's export-led industrialization has been among the most successful examples of economic development in recent history. During 1962-78, real GNP grew by 10% p.a. and per capita income more than tripled in real terms. Coupled with industrialization and urbanization, major developments and changes in the transportation sector complemented and supported the transformation of Korea's economy. Passenger traffic tripled between 1964 and 1971 and then tripled again by 1981; freight traffic increased nine times and five times during the respective periods.

1.02 The Government of Korea's (GOK) basic transport planning objective in the past has been to increase transport capacity in line with projected traffic growth and to avoid major bottlenecks. This objective has been largely achieved. Furthermore, the transport system as developed is reasonably balanced, as there is no substantial uneconomic allocation of traffic among the various modes.

1.03 Large investments in transportation infrastructure have been complemented by a considerable effort to improve the efficiency of the transportation system through the establishment and strengthening of institutions to plan, construct, maintain and operate the facilities and services. This is true both in the public sector, with the establishing and strengthening of institutions such as the Korean National Railways (KNR) or the Transport Coordination Bureau (TCB) in the Ministry of Transport, and in the private sector by the successful development of many contractors capable of handling a wide range of public works in Korea and abroad.

1.04 The Bank has played an active role in advising and assisting the Korean authorities in pursuing their transport objectives. A summary of investments follows.

	Signing Date	Loan/ Credit	Amount (US$ million)
1. Railways I	8/17/62	C-25	14.0
2. Railways II	12/18/67	C-110	11.0
3. Railways III	5/14/70	C-183	15.0
		L-669	40.0
4. Railways IV	11/22/72	L-863	40.0
5. Railways V	4/10/75	L-1101	100.0
6. Railways VI	4/10/78	L-1542	120.0
7. Railways VII	5/21/80	L-1836	94.0
Subtotal			434.0
8. Coal & Cement Distribution	4/29/83	L-2267	122.0
9. Ports I	6/27/73	L-917	80.0
10. Ports II	4/28/77	L-1401	67.0
Subtotal			147.0
11. Grant for Transportation Survey	9/13/65		0.2
12. Highway & Transportation Coordination Surveys	7/24/68	C-S4	3.5
13. Highways I	6/29/71	L-769	54.5
14. Highways II	1/25/74	L-956	47.0
15. Highways III	2/20/76	L-1203	90.0
16. Highways IV	12/22/78	L-1640	143.0
17. Provincial & County Roads	12/30/82	L-2228	125.0
18. Highway Sector Loan	3/22/84	L-2392	230.0
Subtotal			693.2
Total			1,396.2

The Railway Subsector

1.05 With the modernization of its network which was assisted by the Bank through seven projects, the KNR remains the most economic means of land transport for moving bulk traffic over medium and long distances. KNR now operates a well maintained 3,100 route-km network of standard gauge including 610 km of double track and 47 km of narrow gauge. About 370 km of single

track industrial lines serving the northeast coal and cement producing areas are electrified, as well as about 100 km of the Seoul Metropolitan Electric Suburban Railway System (SMESRS) linking Incheon and Suweon. Staff comprises 38,000 people, with 33,500 permanent employees. Productivity is high in terms of traffic units (pass-km plus net ton-km), and was 847,000 per staff member in 1983 compared to 500,000 for European railways; dense urban and intercity passenger traffic and heavy bulk commodity traffic contribute to this.

1.06 KNR's freight traffic is substantial and concentrated on a few bulk commodities. In 1983, it carried 50.3 million tons of freight, an 8% increase p.a. since 1966, on a 1,222 km average distance, amounting to 11.2 billion ton-km. Traffic exceeded 14 million tons on the most heavily used section of the northeast industrial line (Taebaek). The next heaviest used sections, the Jung-Ang line south of Jecheon and the Seoul-Busan line, carry around 4 million tons annually. The main commodities transported include coal with 20.8 million tons p.a. which doubled since 1966, and cement with 11.1 million tons p.a., quadrupling since 1966. In addition, other bulk commodities (ore, oil, fertilizer, and grain) accounted for 78% of KNR's total freight ton-km in 1983, up from 66% in 1966.

1.07 KNR's main revenues come from passenger traffic but competition with road transport is severe. The opening of the Seoul-Busan and Daejon-Gwangju expressways in 1970-73 marked the beginning of intense road competition by long-distance bus transport. The rise in personal incomes increased people's mobility, and their demand for greater comfort resulted in a shift to higher class trains. Also, with the opening in 1974 of KNR's electrified suburban lines connected to the first Seoul subway line, a new era of rapid transit started. After a serious decrease in the early 1970s, passenger traffic grew at a rate of 7% p.a. from 1975 to 1980, but has since leveled off. The proportion of passengers riding lower class (ordinary) trains has declined to 35%, with the balance riding limited express and special express trains which increased over five-fold since 1972. In 1983, 136 million long-distance passengers were transported; passenger traffic on the SMESRS also grew rapidly, exceeding 315 million passengers that year. These trends indicate the areas in which KNR should increase its services.

1.08 Operating efficiency remains high and in general continues to improve. KNR earned positive returns until 1971; its financial situation then deteriorated as inflation increased costs faster than tariffs and required annual government subsidies. Historically, tariffs for freight and ordinary passenger trains were much below costs and were cross-subsidized by the profitable long distance passenger services. However, covenants in successive Bank railway projects emphasized the need to increase freight tariffs in real terms which were raised by over 150% between 1975 and 1983 despite rapid inflation. Freight revenues now cover total costs excluding debt service. Also, since 1978 passenger fares have been raised somewhat faster than the cost of living, with the exception of fares for ordinary trains which KNR intends to raise gradually.

II. PROJECT FORMULATION

2.01 The project was identified by the Korean Government and prepared with the assistance of consultants financed under the Sixth Railway Project. The project directly focussed on the goals for Bank participation in the transport sector set jointly by the Bank with the Korean Government, namely to increase capacity of the transport system in the most economically efficient way and to develop and strengthen the institutions dealing with the transport sector.

2.02 During the mid-1970s in Korea, the combination of increasing incomes and Government's policy of restricting the ownership and use of private automobiles led to sharply increasing demand for express train services, with the number of passengers transported on these trains increasing fivefold between 1974 and 1979. The Seventh Railway Project therefore offered an opportunity to the Bank to support two key Government policies: (a) to discourage the use of private automobiles by improving public transport; and (b) to concentrate the country's physical development around five cities: Daejon, Daegu, Masan, Gwangju and Jeonju, by improving passenger transport to these cities from Seoul and Busan. There were also energy saving considerations which were important at what was then a period of recurrent oil crises. With their high occupancy, passenger trains consume less fuel per passenger-km than expressway buses on long distance routes such as Seoul-Busan, and the Government wanted to promote energy conservation.

2.03 The project appraisal mission, composed of an engineer, an economist and a financial analyst, visited Korea in September 1979 and reviewed the project documents. These included the investment plan, economic evaluation, engineering plans, bid documents, traffic data and other information requested by the Bank and prepared by KNR. The project essentially consisted of (a) the investments which KNR planned for 1980-82; and (b) technical assistance for implementation of management reforms as well as for transport and urban transport feasibility studies.

2.04 Major issues raised at appraisal were:

(a) Doubling of the Chung Bug Line. Section 3.12 of Loan Agreement 1542-KO (Sixth Railway Project: KNR's 1978-79 Investment Plan) provided that "the Borrower shall take or cause to be taken all action necessary to ensure that substantial changes in KNR's Investment Plan shall only be made with the concurrence of the Bank," substantial changes meaning an increase or a decrease of more than W 10 billion. Despite this convenant the Government undertook in 1978 and 1979 several investments exceeding W 10 billion without Bank concurrence. Most of these investments were technically and economically justified and the Bank agreed to add them to the original plan. The only investment to which the Bank objected was the double tracking of the entire Chung Bug Line (113 km) instead of the 8.6 km section for which double tracking was originally envisaged. In its letter of September 4, 1979 the Bank suggested that the Government, which undertook these works for political and

military reasons, should not include them in KNR's 1978-79 Investment Plan but rather consider them as a "special line" to be operated by KNR. This implied that the Government would itself finance the double tracking of the additional 104.4 km and provide KNR with subsidies as necessary to make up for any loss KNR would suffer as a result of operating the line. The Government agreed to follow up on the Bank's suggestion, and the appraisal mission recommended that confirmation of the Government's plans on the financing of this investment should be a condition of loan negotiations.

(b) Loan Amount. The loan was to finance part of the project's foreign-exchange expenditure (estimated at US$167 million). KNR requested to raise the loan amount to US$100 million - as opposed to the US$75 million then earmarked in the Lending Program. The mission noted that KNR was probably not capable of raising money directly from foreign commercial sources because (i) it had not yet acquired corporate status and (ii) it functioned as a government department and depended for its financial viability on an annual budgetary grant. Even with a loan amount increased to US$100 million, the Bank's contribution to total project cost would still be proportionally lower than in past railway loans to Korea. A US$100 million loan would represent roughly 15% of the cost of the seventh project while the US$120 million Bank loan for the Sixth Railway Project financed about 30% of the corresponding total project cost. The mission recommended that the loan amount be raised to approximately US$100 million.

(c) KNR's Organization and Management. Under Section 3.08 of Loan Agreement 1542-KO the Government had agreed on the execution of a management study as part of the Sixth Railway Project and on implementation of the study's recommendations "as shall be agreed with the Bank." The study was completed and the appraisal mission had the opportunity to review it and to discuss its major recommendations with KNR, the Ministry of Transport and the Economic Planning Board (EPB). The study's main conclusion was that KNR should be gradually transformed from its present status as a semi-autonomous government agency to that of a public corporation. KNR's managerial functions should be delegated to three deputy administrators respectively in charge of Planning, Coordination and Control; Operations; and Administration. Short-term measures would focus on the establishment of a management information system and a marketing organization within KNR. The latter's main function would be to conceive and carry out an aggressive marketing policy with immediate action toward obtaining a higher share of Korea's long distance container traffic for which the railway has an economic advantage. Mid-term action would aim at strengthening KNR's capability in the fields of planning, mainly economic analysis of investment planning, and of financial management and accounting procedures with special emphasis on introduction of performance budgeting, backshop accounting and incremental long-term variable costing. The mission recommended that the Government be asked to prepare a draft time-phased plan for implementing the measures suggested by the study.

(d) Tariffs. The mission noted that in recent years the Government increased KNR's tariffs several times in order to meet or at least approach financial objectives agreed with the Bank. However, freight rates were generally raised across the board rather than cost based. KNR's tariff structure needed to be revised to ensure that passenger and freight rates will be at least equal to the variable costs incurred by KNR, but not higher than comparable competitor's tariffs or KNR's total costs including a reasonable rate of return on investments. The mission recommended that the Government and KNR propose and finalize during negotiations, a time-phased plan for implementing a new cost-based tariff structure.

(e) Sector Studies. The comprehensive transport study then being done by Korean consultants (KIST) under the Sixth Railway Project was to be available in June 1980; it would give a general indication of investments needed in the transport sector. One of the likely major issues concerned ways and means to increase transport capacity in the Seoul-Busan corridor; one possibility being considered was a high speed railway line. The mission recommended that following up on the KIST study, a more detailed analysis of possible alternatives should be made and that such a study be financed by the project. Another related issue concerned the proper planning and design of the large transport investments under way or planned in the Seoul metropolitan area and possibly soon in the Busan metropolitan area. It had become necessary that proper urban transport studies be made of the two metropolitan areas and not just of the special cities, as was done in the past. The mission felt that agreement should also be reached on these studies at negotiations.

2.05 Loan negotiations were held in Washington from March 17 to March 21, 1980 and the above issues were discussed. On the Chung Bug line, Government proposals to fully reimburse KNR for the capital cost (about $14.0 million) over a 2-3 year period were accepted. On project cost, the Bank agreed, in view of substantial oil price increases in 1979 and revisions to the GOK's foreign borrowing plans, to increase the loan amount by US$15.0 million plus an additional US$4 million to finance transport studies; these additions brought the loan amount to US$94.0 million. On organization it was agreed that KNR should be converted from a government entity to a fully autonomous corporation no later than January 1, 1987. Also, a series of short- and medium-term managerial measures together with timetables for their implementation were agreed upon and included in a Supplemental Letter to the Loan Agreement. On tariffs, it was agreed to set them at a sufficiently high level to ensure that KNR's revenues meet its operating expenditures, debt service obligations and a reasonable proportion of capital costs.

2.06 The project as finally agreed at negotiations had the following major components:

(a) completion of the quadrupling of the 32.3 km section Seoul-Suweon;

(b) expansion of the West Seoul freight terminal at Susaeg;

(c) installation of a centralized traffic control system (CTC) on about 270 km of lines;

(d) rail or track renewal on about 320 km and provision of 70,000 concrete sleepers and 70,000 cu m of ballast;

(e) bridge and tunnel strengthening and right-of-way improvements;

(f) separation of road and rail at level crossings;

(g) provision of track maintenance equipment and track material workshop machinery;

(h) the acquisition of 10 main-line diesel locomotives, 12 diesel and 16 electric railcars for intercity traffic, 130 electric railcars for Seoul urban traffic, 246 passenger cars and 100 freight cars and repowering of 40 diesel locomotives and 40 diesel railcars;

(i) provision of subsidiary shops for the new Daejeon passenger and freight car shop and improvements to existing workshops and sheds;

(j) improvement of telecommunications and power facilities;

(k) construction of housing for employees and provision of hospital equipment; and

(l) provision of training, technical assistance for implementation of the recommendations of the management study carried out under the Fifth and Sixth Projects, and feasibility studies for transport sector investments selected upon completion of the national transport study being carried out under the Sixth Railway Project.

2.07 The loan was approved by the Board on April 29, 1980, the Loan Agreement was signed on May 21, 1980 and became effective on August 29, 1980. The conditions of effectiveness included the execution of a Subsidiary Loan Agreement between the Government and KNR whereby US$88.2 million of the Bank loan was onlent at similar terms and conditions as between the Bank and the Government. The Bank loan carried a term of 17 years including 4 years of grace at 8.25% per annum.

2.08 The total foreign exchange component was estimated at US$160 million equivalent. The Bank loan of US$94 million would cover the costs of about 33,800 tons of rail, track maintenance equipment, 2 breakdown cranes, 246 passenger cars, 100 freight cars, workshop equipment, technical assistance and training. The remainder of the foreign expenditures was to be met through borrowing from other sources. About US$8.0 million were to be provided by the U.S. Export-Import Bank and US commercial banks, mainly for diesel engines, at an interest rate of 9% repayable over 9 years; about US$38.0 million was expected to be obtained from a foreign source, possibly with the involvement of a national export credit guarantee agency, for signalling equipment; about US$5.0 million for hospital equipment was to be provided through a loan from

the Japanese Overseas Economic Cooperation Fund (OECF); a further US$15.8 million would be provided by the Korea Exchange Bank at an interest rate of 7.5% repayable over 20 years.

III. PROJECT IMPLEMENTATION AND COSTS

Overview

3.01 In 1980 both passenger and freight traffic were slightly below their respective 1979 levels, with passenger traffic reaching only 87% and freight traffic 96% of appraisal projections. The Korean economy was suffering a downturn and accordingly several capital investment programs were scaled down in early 1981, including that of the railways. The railway plan reductions were in items not financed by the Bank, and total project cost declined from the appraisal estimates of US$604 million to US$367 million. Due to overall budgetary constraints at that time, project implementation was initially slow but once underway it was implemented efficiently. Most civil works were completed with minimal delays, but the loan closing date was postponed by one year to December 31, 1984 mainly to allow completion of the multi-modal transport studies. KNR was the executing agency for all project works.

Civil Engineering Works

3.02 Following the downturn in traffic and the generally poor economic climate, KNR with Bank support decided to cut back its investment plan in early 1981 by deferring some items and reducing the quantities for others. Accordingly the following items were deferred to the 1982-86 investment plan:

	1981 Cost (Won billion)
Industrial sidings (POSCO and Gwangyang)	10.84
By-pass line, Jecheon	1.68
Freight terminal, West Seoul	10.29
CTC, Yeongju-Gyeongju (163.5 km)	32.79
CTC, Jecheon - Baegsan (106.7 km)	21.32
Tokenless block signalling	1.78
Other items	1.46
Total	80.16

Also, major quantity reductions were made for the following items:

	Quantity Reduction			Cost Reduction (1981 won billion)		
	From	To	Index	From	To	Index
Station installations	-	-	80	9.54	6.99	73
Track renewal	110 km	65 km	59	10.78	8.68	80
New electric railcars for SMESRS	130	88	68	58.71	36.41	62
Railcars for long distance	28	20	71	7.61	7.09	93
Improvement of existing workshops and sheds	-	-	30	8.44	2.78	33
Housing and hospitals	-	-	70	7.85	5.76	73

As a result of these measures the total project cost estimate was reduced to W 239 billion or 32% below the appraisal estimate.

3.03 In addition, there was one new item when the Government for political reasons decided to double track the 101 km Iri-Songjeongri section of the Ho Nam line. Construction started in February 1981 and should be completed by mid-1985. The total cost was estimated at W 152 billion (about US$234 million) of which about W 9 billion were spent in 1981. Since the amount spent during the 1977-81 investment plan period was less than W 20 billion, the Government's decision was not interpreted as a violation of section 4.06 of the Loan Agreement.

3.04 All of these rearrangements made project implementation initially slow. However, once underway the project works were efficiently executed and essentially completed by late 1983. KNR demonstrated an excellent implementation capability.

Procurement

3.05 Procurement was handled by the Office of Supply (OSROK). Most items were procured through international competitive bidding with Korean suppliers winning many of the contracts. Some items were procured on schedule, e.g., contracts for the rails and breakdown cranes but there were some delays in others, e.g., the freight cars. As a whole, delays were due primarily to planned slowdowns in the investment plan; there were no significant problems with the conduct of the procurement process itself. Table 3.1 has details for all items procured.

3.06 The only Bank/Borrower procurement controversy revolved around the purchase of 2,052 tons of special heat-treated rails from a Korean supplier who was the lowest evaluated bidder. The Bank was concerned since KNR had in September 1983 requested an extension of the loan closing date because, among other reasons, they needed to perform a seven-month test of the Korean supplier's heat-treated rails before they could place an order. The Bank felt that the supplier may have been technically unqualified and withheld approval of the bid until a mission could fully investigate all available evidence.

3.07 Accordingly, all documents were reviewed during the December 1983 mission to Korea. It was found that the said Korean manufacturer had been producing rails for more than six years. Its domestic customers included KNR, the Seoul and Busan metropolitan rail systems and several coal mines. KNR was satisfied with the rails it had received from this supplier in the past. Heat-treated steel for the rails in question was manufactured under a licensing arrangement from a large U.S. company, and the Korean manufacturer was apparently using similar technology to manufacture specialty steels for other users in Korea as well as for export to the U.S. Although the Korean manufacturer could produce only 15 m lengths of heat-treated steel rails, it was already planning to expand facilities to handle the 25-m long rail that KNR needed. All other technical specifications, e.g., hardness distribution, tension, bending drop, chemical composition, etc., were satisfactory. The mission therefore recommended approval of the contract with the Korean supplier which was done in early 1984.

Feasibility Studies

3.08 Several major studies were financed under the Railways VII loan. They were mostly intermodal and covered urban, regional and intercity transport. A brief description of studies under each category follows.

Urban Transport

3.09 Seoul City Transport Improvement Program Feasibility Study. The basic objectives of the study were to (a) assist the city government in establishing effective traffic management and traffic planning units; and (b) to develop traffic management, pedestrian facilities and road construction programs to relieve traffic congestion in the city. A team of American consultants with Korean partners was selected to conduct this 12-month study and contracts were signed in April 1982. The study was well executed and the final report was issued in September 1983. Its recommendations formed the basis for the current Seoul urban transport project which will try to complete major missing links in the Seoul road netork and introduce Transport System Management (TSM). TSM mostly includes the application of low-cost improvements to streets in major corridors which will significantly enhance capacity.

3.10 Busan City Transport Improvement Program Feasibility Study. This study had objectives similar to the Seoul study and was carried out by mostly Korean teams with selected foreign specialists. It was completed in August 1984 and its recommendations formed the basis of the Busan urban transport project which is about to be preappraised. The project will mostly focus on locating terminals and other improvements to public transit as well as use of the TSM concept.

3.11 Public Transport Operations Study. The study's objectives were to further develop Ministry of Transport (MOT) capabilities in evaluating transport policies, regulations on public transport and in setting fare structures, route assignments and licensing. The study was conducted by Korean consultants, took about eight months and was completed in August 1984. The study analyzed the problems Seoul City has experienced with public transit in certain arterial roads and also difficulties in bus/subway

interchange. In its recommendations the study suggested improvements to regulatory systems, particularly for buses and taxis. These findings form the basis for current Bank/MOT dialogue on regulation and fare setting for the 90 odd bus companies in Seoul (which are all privately operated and profitable). Some of the study's routing and fare setting recommendations are currently being implemented while others will proabably be components of the proposed second Seoul urban transport project.

3.11 Training Requirements in Transport Planning. The objectives of the study were to (a) identify types of training needed for urban transportation personnel (both in traffic management and transport planning); and (b) develop the organizational plan and personnel qualifications needed to carry out the training. The nine-month study was conducted by a Korean consulting team assisted by Seoul National University and was completed in September 1984. The study suggested establishing a national training institute for transportation personnel and outlined a syllabus for transport courses that should be offered as well as proposals for a research program. Current Bank/MOT discussions are exploring the possibility of implementing these findings.

3.12 Secondary Cities Transport Improvement Program. The study had objectives similar to those of the Seoul and Busan studies, but as applied to the cities of Daegu, Daejeon and Gwangju. Korean consultants assisted by selected foreign specialists are conducting the nine-month study, and issued an interim report in October 1984. The final report is expected in mid-1985. Study recommendations should form the core transport improvement plans for the cities.

Regional Studies

3.13 The project financed the multimodal Kyeonggi (Seoul) region integrated transport study, the objectives of which were to study land transport requirements (road/rail) and to conduct feasibility studies for proposed new links to determine the most cost-effective transport system for the region. The two-phase study, conducted by French consultants in association with a Korean firm, started in early 1984. The Phase I report was issued in December 1984 and identified specific road/rail segments which should be studied further. The Phase II (feasibility) study is now in progress and is due for completion in November 1985. Since this is after the closing date of the Railways VII loan, arrangements have been made for continued funding of the study under the Coal and Cement Distribution Project (Loan 2267-KO). The results of the feasibility study will be to identify the exact road network components (probably a Seoul beltway and major feeder arteries) and rail linkages (mostly suburban light rail) which will form the basis of the Regional Transport Project tentatively scheduled for FY87.

Intercity (Seoul-Busan Corridor) Transport Study

3.14 The study's objective was to review the long-term transport investment needs in the Seoul-Busan corridor and to examine the feasibility of a High Speed Train (HST) between Seoul and Busan. The two-phased study by a team of American, Korean and Danish consultants started in March 1983. Phase I, which reviewed the multimodal alternatives, was completed in April 1984. It

recommended expanding and upgrading several highways in the Seoul-Busan corridor and introducing a high speed trair (like the French TGV or Japanese Shinkansen) by 1997. The Phase I report was subject to detailed reviews by a steering committee before approval was given to proceed to Phase II which was a detailed feasibility study of the high speed train; this was completed in February 1985. The Phase I study also recommended the immediate installation of a Centralized Traffic Control (CTC) system on the rail lines from Suweon to Daegu to improve signalling and train handling capacity. This is needed to meet the capacity requirements of the growing express passenger train traffic and also as an interim step until the HST can be built. The CTC system forms the major component of the Seoul-Busan Corridor project which will be presented to the Bank's Board for approval in June 1985.

Technical Assistance

3.15 This project component largely included providing consulting services for implementing commercial accounting, costing and management improvement programs. Its objective was to improve KNR itself and prepare it for full autonomy by January 1987. Implementation of the various programs is discussed under "Institutional Development" in paras. 6.01-6.04.

Training

3.16 The loan included funds for overseas training of staff, particularly in the field of investment planning and computerized commercial and cost accounting. This component was well executed. Several trainees were selected and sent overseas, mostly to the U.S. and Japan for intensive courses. They have all completed their courses, returned to KNR and have made significant contributions to KNR, especially in implementing the commercial accounting program.

Project Cost

3.17 The cost of the total project as originally approved in 1980 was W 350.5 billion (US$604.3 million). After the reductions in project scope in 1981, the total cost of the revised project was W 239 billion. The final cost was W 277 billion (US$410.8 billion), representing an increase of 16% in Won (or 12% in US$) above the revised estimate. The difference in cost overrun by currency is due to extensive and repeated devaluations of the Won 1/ during the project period and the fact that cost estimates were based on the U.S.

1/ The Won was devalued five times in 1980 alone, from W 485 in January 1980 to an eventual W 682 to the US$ by November 1980. Annual Conversion averages were W 485 at appraisal, W 607 in 1980, W 681 in 1981, W 720 in 1982 and W 783 in 1983, to the US dollar.

dollar. However, given the rampant inflation [2/] prevailing in Korea during the early project implementation period, it is commendable that costs were contained to this extent. Overall the costs of project quantities were somewhat higher than the appraisal estimate, with unit prices substantially higher than estimated for permanent way works, locomotives and railcars (except for railcars for Seoul suburban traffic) while unit costs for double tracking, crossing loops and station yards were below estimates. Details of actual and appraisal costs are given in Table 3.3.

Loan Disbursements

3.18 Cumulative disbursements (detailed in Table 3.4) compared to appraisal estimates were as follows:

	FY81	FY82	FY83	FY84	FY85
			(US$ million)		
Appraisal	52.0	89.5	94.0	-	-
Actual	9.8	75.3	86.1	92.0	93.0

Even though there was a slow start, most of the KNR portion of the loan (US$88.2 million) was disbursed by end-FY83 as originally planned. Disbursement of the remainder was delayed mainly by the urban transport studies (US$2.6 million), the multimodal transport studies (US$3.0 million) and technical assistance and training (about US$0.2 million) where implementation took more time than expected. As discussed (para. 3.05), there were also some minor procurement delays which affected disbursements. A small, undisbursed portion of the loan ($1.039 m) was eventually cancelled. It should be noted that even though slower than appraisal estimates, disbursements were much faster than the standard country profile which suggests a seven-year schedule.

Reallocation of Loan Funds

3.19 At KNR's request, the Bank loan funds disbursement by category was changed on May 29, 1981 and on December 14, 1982 so as to utilize the unallocated funds. The following table shows the original, reallocated and final allocation of loan proceeds:

2/ The wholesale price index was: 1976-100, 1977 = 104.4, 1978 = 116.6, 1979 = 138.4, 1980 = 192.3, 1981 = 235.5, 1982 = 247.6, 1983 = 249.

Category	Loan Agreement	Reallocation of December 1982 (US$ thousand)	Disbursed as of April 23, 1985
1. Project Part C: Rail track maintenance equipment	18,350	25,456	21,988
2. Project Part D: Breakdown cranes, passenger & freight cars	53,850	58,593	64,671
3. Project Part E: Work shop equipment	2,080	2,196	466
4. Project Part G: Overseas training and consultant services for technical assistance	1,900	1,955	1,551
5. Project Part H: Transport studies and overseas training	5,800	5,800	4,285
6. Unallocated	12,020	0	0
Total	94,000	94,000	92,961

Fulfillment of the Main Loan Covenants

3.20 Compliance with covenants (other than those relating to financial issues) was generally satisfactory. Problems affecting the financial covenants are discussed in Chapter V and were more a result of macroeconomic factors and government policy than any actions/inactions by KNR management. In areas of relative autonomy, KNR has fully and fairly complied with all covenanted requirements. Table 3.5 details all major covenants and their degree of compliance. It should be noted that many of the covenants in the Loan Agreement for the Seventh Railways Project were superseded by new provisions in Loan Agreement 2267-KO for the Coal and Cement Distribution Project.

IV. TRAFFIC AND OPERATIONS

Freight Traffic

4.01 Freight traffic data for the period 1966-1984 are given in Tables 4.1-4.3. In making traffic forecasts for this project at appraisal, a growth rate of 3% to 5% per annum was used. This represented a conservative estimate and an attempt to more accurately predict freight traffic because forecasts under past projects were much too optimistic. Three scenarios for 1980-86 were made at appraisal, using high (5% p.a.), best (4% p.a.) and low (3% p.a.) growth rates in freight ton-kilometers. The actual growth rate so far has averaged 2% p.a., hence the low growth scenario was the closest to reality. The following table compares actual ton-km with the three forecasts.

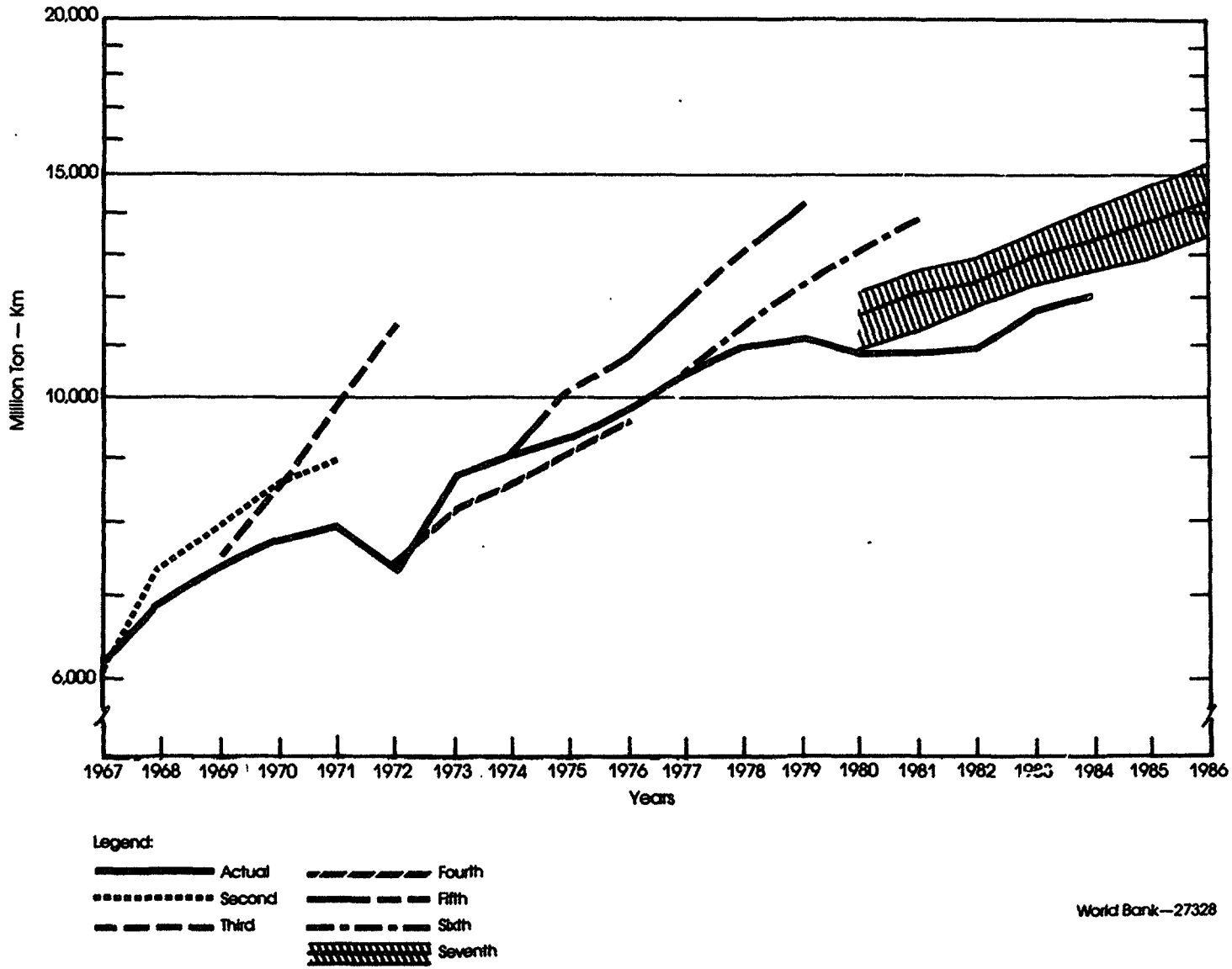
KNR FREIGHT TRAFFIC 1979-84: ACTUAL AND FORECAST
(million ton-km)

Year	Actual	Forecast		
		High	Best	Low
1979	11,081	-	-	-
1980	10,798	12,044	11,532	10,975
1981	10,815	12,608	12,026	11,374
1982	10,892	12,860	12,356	11,734
1983	11,629	13,501	12,945	12,228
1984	12,033	14,085	13,329	12,589

4.02 The data show that freight traffic was adversely affected by the economic downturn of 1980-81 and only recovered by early 1983 to its 1979 level. Following the Presidential assassination in 1980, the economy stagnated and there was a nationwide downturn in construction as well as industrial activity. There was little growth in demand for coal and a sharp decline for cement, the two commodities on which KNR freight forecasts were mainly based. The recovery since 1982 has been fairly strong, averaging 3.4% p.a.; if such a growth rate is maintained, actual freight traffic will exceed the targets set for 1986 under the low growth scenario. In future, KNR should probably count on a 2-3% p.a. long-term growth rate in freight ton-km. For the ten years 1975-1984 inclusive, it has averaged 2.9% p.a. growth in freight ton-km. This period has included downturns, upturns, slow growth, rapid growth and modest growth as shown on Chart 1 overleaf. It is probably representative of the dependence of KNR freight traffic growth on the performance of the economy as a whole.

CHART 1

KOREA
SEVENTH RAILWAY PROJECT
Freight Traffic Forecast and Actual
Second to Seventh Railway Projects, 1967—1986



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The following table compares the actual and forecast volumes of the major commodities transported.

KNR FREIGHT TRAFFIC: ACTUAL AND FORECAST
(million ton)

	Total		Coal		Cement		Ore		Oil		Fertilizer		Grain		Container	
Year	Actual	Fore-cast	Actual	Fore-cast	Actual	Fore-cast	Actual	Fore-cast	Actual	Fore-cast	Actual	Fore-cast	Actual	Fore-cast	Actual	Fore-cast
1979	50.9	-	18.0	-	11.2	-	3.4	-	4.3	-	2.1	-	1.1	-	0.6	-
1980	49.0	52.3	18.6	18.0	9.8	11.5	3.4	3.6	3.9	4.6	1.7	2.2	1.0	1.1	0.4	0.7
1981	48.8	54.0	21.4	18.2	8.4	12.0	3.9	3.8	3.2	4.8	1.9	2.2	0.6	1.2	0.5	0.9
1982	47.4	55.4	19.6	18.4	9.5	12.5	3.9	4.0	2.7	5.0	1.8	2.3	0.6	1.3	0.6	1.1
1983	50.5	57.4	20.1	18.6	11.1	13.0	4.1	4.2	2.6	5.2	1.6	2.3	0.7	1.4	0.8	1.5
1984	53.7	59.0	23.2	18.8	10.9	13.5	4.3	4.3	2.9	5.4	1.6	2.4	0.7	1.4	0.8	1.7

Passenger Traffic

4.03 Passenger traffic forecasts at appraisal were based on annual growth rates between 5% and 7% in passengers and between 7% and 10% in passenger-km. There was an underlying assumption of a continued 7% to 8% p.a. growth in GNP and also that the Government would continue to maintain a restrictive policy on the ownership and use of private automobiles. While the latter assumption was correct, the actual GNP growth rate, still fairly high on a long-term basis, suffered a brief decline in the early 1980s. Railway intercity passenger traffic then went into a decline, especially ordinary passenger traffic, and has not fully recovered. It is expected that passenger traffic will eventually recover, just as it did from the only previous major downturn in 1970/71. The latter was caused by the 1970 opening of the Seoul-Busan and Daejeon-Gwangju expressways and the resultant intense competition from buses for intercity passengers.

4.04 Passenger traffic statistics are shown in Tables 4.4 to 4.6; data on long distance passenger traffic are summarized overleaf:

KNR: INTERCITY LONG DISTANCE PASSENGER TRAFFIC

Year	No. of passengers (million)						Passenger-km (billion)					
	Total		Ordinary		Ltd. Express		Total		Ordinary		Ltd. Express	
	Actual	Forecast	Actual	Forecast	Actual	Forecast	Actual	Forecast	Actual	Forecast	Actual	Forecast
1979	162.1	-	112.9	-	38.1	-	16.3	-	5.5	-	8.8	-
1980	164.9	171	116.1	114	37.3	45	16.4	17.8	5.9	5.5	8.5	10.3
1981	153.5	180	106.3	114	39.7	53	15.7	19.4	5.6	5.4	8.8	11.7
1982	143.3	189	97.9	115	43.1	60	15.1	20.9	5.2	5.4	9.2	12.9
1983	136.5	198	85.9	115	48.7	68	15.4	22.3	4.5	5.3	10.3	14.4
1984	131.1	208	75.4	116	53.8	76	15.2	23.7	3.6	5.2	11.0	15.7

The table shows actual figures compared with the low growth forecast for passengers (5%) and for passenger-km (7%). A few trends are immediately obvious. KNR has lost about 34 million passengers from its peak ridership of approximately 165 million in 1980. All of the loss is due to a continuous decline of 41 million in ordinary passenger patronage from its peak of 116 million in 1980 to a 15 year low of 75 million in 1984. The reverse of this trend occurs in the case of the limited express service which gained nearly 17 million riders in the 1980-84 period. Most of the express passengers probably transferred from ordinary trains as the rising income levels and mobility in Korea led to an increase in the value of time. People are therefore more willing and able to pay for higher levels of service. Ironically, this trend of passenger growth (9% p.a., 1980-84) in the more profitable express train services coupled with a decline (average 8% p.a., 1980-84) in ordinary train services may prove ultimately to be beneficial to KNR profitability even though total passenger patronage has declined.

4.05 In terms of passenger-km, a similar but somewhat modified trend occurred. Overall passenger-km declined by only 7.3% over the period 1980-84 versus the 20% decline in the actual number of passengers. This again was due to the qualitative change in KNR ridership - the partial substitution of express passengers who traveled an average 206 km in 1984 for ordinary passengers who only averaged 47 km. Hence the decline in overall passenger-km actually masks a very important trend - that is, KNR has had a 7% p.a. growth in passenger-km during 1980-84 for express train service. Chart 2 overleaf shows actual and forecast intercity passenger traffic during 1967-86.

KOREA
SEVENTH RAILWAY PROJECT
Passenger Traffic Forecast and Actual
Second to Seventh Railway Projects, 1967—1986

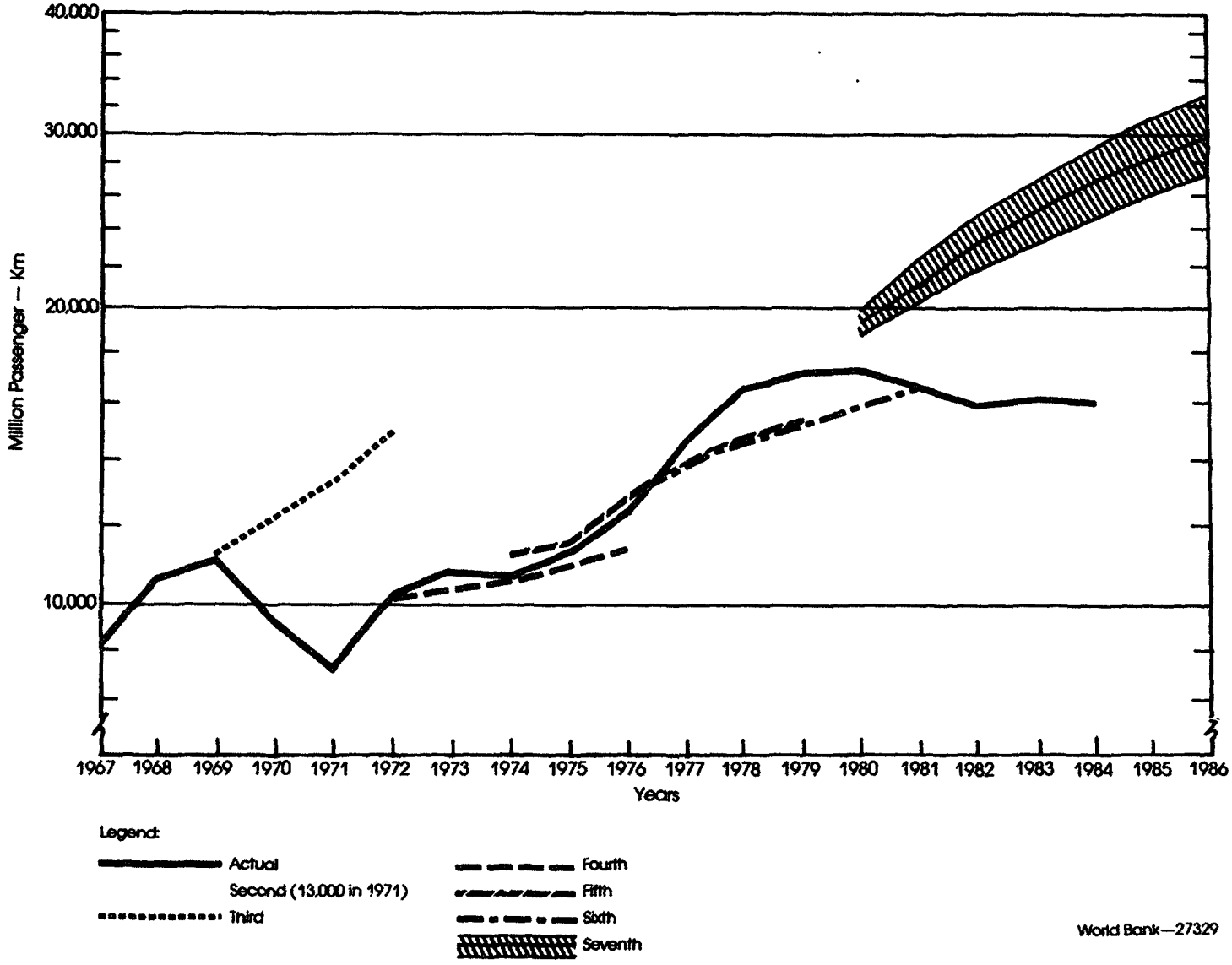

CHART 2

4.06 The special express service (Saemaul trains) did not do as well as expected, but is still a profitable service. Data on operations during 1979-84 are summarized below:

KNR: SPECIAL EXPRESS SERVICE

Year	Passengers (million)		Passenger-km (million)		Average distance (km)	
	Actual	Forecast	Actual	Forecast	Actual	Forecast
1979	2.4	-	772	-	322	-
1980	2.5	3.0	797	975	319	325
1981	2.2	3.5	722	1,120	328	320
1982	1.9	4.0	641	1,260	337	315
1983	1.9	4.5	607	1,395	319	310
1984	1.9	5.0	589	1,525	313	305

This service's higher fares relative to express trains or buses probably partly explain the slowdown in patronage over the period. However, the average distance has increased; this is the only passenger rail statistic to exceed appraisal projections. If this continues and KNR ridership stabilizes, then the decline in passenger-km may cease.

4.07 KNR's Seoul urban service (SMESRS) which started in 1974 grew at an annual rate of 7.5% p.a. in terms of passenger-km during 1980-84. This represents a considerable slowdown from previous growth rates, though in itself is a good, sustainable rate of growth. It shows that the period of initial acceptance and rapid growth in this service is over, and though there may be occasional periods of return to past super-growth levels (usually whenever new lines are opened), long-term growth may more likely match the recent 7% figure. Some statistics follow:

KNR: SUBURBAN RAIL SERVICE

Year	Passengers (million)		Passenger-km (billion)		Average distance (km)	
	Actual	Forecast	Actual	Forecast	Actual	Forecast
1979	240	-	4.3	-	17.9	-
1980	245	339	4.4	5.9	18.1	17.3
1981	268	420	5.0	7.2	18.6	17.0
1982	282	500	5.2	8.4	18.4	16.9
1983	315	579	5.6	9.6	17.8	16.7
1984	341	652	5.9	10.7	17.3	16.4

Traffic Levels by Mode

4.08 For the transport sector as a whole, the railroad's market share has been declining since 1966. Highway transport is the dominant mode in terms of volume with an 82.8% share of the 430 million tons of domestic freight in 1982, a tremendous increase from its 47% share of 51 million tons of freight in 1966. The railways managed only an 11% share in 1982, down from its 46.9% share in 1966. The maritime share has increased to 6% during the period, up by 1%. As indicated in the following table, the modal split in terms of ton-km showed similar developments.

SHARES OF TOTAL FREIGHT TRANSPORT

Mode	1966 tkm (bil)	1966 Share (%)	1971 tkm (bil)	1971 Share (%)	1976 tkm (bil)	1976 Share (%)	1981 tkm (bil)	1981 Share (%)	1982 tkm (bil)	1982 Share (%)
Railroad	5.4	81.6	7.8	48.9	9.7	44.6	10.8	37.5	10.9	36.9
Highway	0.6	8.4	3.5	22.1	6.5	30.0	10.1	35.0	10.8	36.4
Maritime	0.7	10.0	4.7	29.0	5.5	25.4	7.9	27.5	7.9	26.7
Total	6.7	-	16.1	-	21.8	-	28.8	-	29.6	

During 1966-82 total ton-km have more than quadrupled, but the railway has only doubled the amount it carried. Highways handled the majority of the growth in freight traffic, causing the railway market share to decline substantially. It is estimated that by end-1984 highway transport had the absolute largest market share in ton-km.

4.09 A similar development occurred in passenger transport in which highway transport had a much higher growth rate than that of rail. As shown in the following table, highway transport had the dominant share in both passengers and passenger-km since before 1966; in the subsequent years the dominance continued. To be sure, there was enough traffic growth overall (13.7% p.a. average) in passenger-km from 1966 to 1982 to support all modes of transport.

SHARES OF TOTAL PASSENGER TRANSPORT/a

Mode	1966 pkm (bil)	1966 Share (%)	1971 pkm (bil)	1971 Share (%)	1976 pkm (bil)	1976 Share (%)	1981 pkm (bil)	1981 Share (%)	1982 pkm (bil)	1982 Share (%)
Railway	8.7	42.5	8.8	27.1	14.3	24.4	21.5	23.6	21.0	22.0
- intercity	8.7		8.8		12.4	21.2	16.6	18.2	15.8	16.5
- SMESRS	n.a.		n.a.		1.9	3.2	4.9	5.4	5.2	5.5
Highway	11.5	56.2	22.9	71.1	43.4	74.0	67.3	73.8	72.1	75.3
- intercity	n.a.		11.9	37.0	25.0	42.7	35.5	38.9	38.2	39.9
- urban	n.a.		10.9	34.0	18.4	31.4	31.7	34.9	33.9	35.4
Total	20.4	-	32.2	-	58.6	-	91.1	-	95.7	-

/a Figures may not add up due to rounding.

Railway passenger traffic growth averaged 7.6% p.a. overall during the period 1966-82; this is a little more than one half of overall traffic growth. The railway has lost traffic share, perhaps irreversibly. However, as discussed above (paras. 4.04-4.05), this is not necessarily a negative indicator because the traffic actually lost (ordinary trains) may be more efficiently served by other modes. The most important question now that KNR seems to be shedding its uneconomic ordinary train traffic is will the growth in express train service demand be stable and continue at current levels.

KNR Operations

4.10 Selected operating statistics for KNR during 1975-83 are shown in Table 4.7. Analysis of these performance indicators supports the well-known fact that the level of KNR's operational efficiency is remarkable. The availability of most rolling stock remained high at around 90%. Due to the slow growth in traffic, the average freight train load increased only slightly from 491 net tons in 1979 to 509 net tons by 1983. On the other hand due to the intercity passenger downturn, the average number of passengers per train decreased from 515 in 1979 to 496 in 1983. Overall there was an increase in the total number of traffic units from 32.5 million in 1979 to 33.3 million by 1983; most of this increase was due to the growth of suburban rail (SMESRS) services. Employee productivity increased over the period from 808,000 traffic units in 1979 to 846,500 in 1983; this was accompanied by a 2% drop in total employees between 1979-89. Turnaround for freight cars also improved from 5.0 days in 1979 to 4.76 days in 1983.

V. FINANCIAL EVALUATION

5.01 In the five years prior to the start of project implementation, KNR experienced a consistent 10% p.a. growth in traffic units. This performance largely resulted from the tremendous growth in passenger-km (12% p.a.) during that period. KNR therefore embarked on a large capacity expansion investment program under the Seventh Railway Project in order to keep up with expected traffic demand. KNR borrowed extensively, and to service the related debt had counted on (a) a continuation of traffic growth leading to full utilization of the additional capacity; and (b) a slowdown in inflation that would help to control costs. Instead there was high inflation and a stagnation in traffic. This led to underutilization of the new investments as overall traffic at first declined slightly and only surpassed its 1979 level (32.5 billion traffic units) in 1983 (33.3 billion traffic units); hence overall growth for the 1979-84 period averaged a mere 1.1% p.a. At the same time, operating costs for these investments increased and also debt had to be serviced. The combination of these factors led to a financial performance that was somewhat below expectations. These results were reflected in KNR's income statement, cash flow and balance sheets which form the background for the following analysis.

KNR Revenues

5.02 Table 5.1 details KNR's income from operations during 1977-84. Some of the main entries are repeated overleaf:

SUMMARIZED INCOME STATEMENT
(Won billion)

	1979	1980		1981		1982		1983		1984	
	Actual	Actual	Appr.	Actual	Appr.	Actual	Appr.	Actual	Appr.	Est.	Appr.
Traffic units (bil)	32.5	32.4	35.5	32.4	38.9	31.9	42.0	33.3	45.2	33.9	47.9
Operating revenue	208.4	280.6	316.2	356.9	421.9	417.3	506.2	470.9	604.9	524.4	684.7
Working cost	182.5	253.0	258.2	318.5	321.9	381.8	387.0	418.1	459.8	441.7	520.8
Depreciation	26.1	28.7	24.9	43.6	29.5	51.3	34.6	57.9	39.9	64.6	44.9
Net operating revenue	(0.2)	(1.1)	33.1	(5.2)	70.5	(15.8)	84.6	(5.1)	105.2	18.2	119.0
Interest	29.7	48.6	40.6	60.1	51.7	69.9	64.6	72.4	75.9	76.7	86.1
Net income	(24.9)	(40.7)	(6.2)	(62.9)	20.3	(74.3)	21.6	(71.6)	31.1	(52.5)	34.8
Subsidies	31.9	5.0	25.8	0.0	0.0	34.8	0.0	35.4	0.0	55.5	0.0
Book profit	7.0	(35.7)	15.9	(62.9)	16.7	(39.5)	17.6	(36.3)	26.9	3.0	30.7
Ratios:											
Working (%)	88	90	70	89	66	92	76	89	76	84	76
Operating (%)	100	100	82	101	78	103	83	101	83	97	83
Rate of return (%)	0	0	3.2	0	5.5	0	5.5	0	6.0	0.4	6.0

The data show that KNR gross operating revenues increased each year from W 208 billion in 1979 to over W 524 billion in 1984 even though there was little change in the total number of traffic units during this period. This was due to increased tariffs and the growth of the more profitable express passenger services. Revenue per traffic unit averaged W 15.46 in 1984, up significantly from W 6.41 in 1979. However, the rest of the income statement shows that while close to covering operating costs, KNR revenues could not cover interest payments and therefore it had substantial losses. Most of the losses can be attributed to ordinary train service, for which the Government provides a partial subsidy. Hence an otherwise good performance by improving the quality of its ridership mix and increasing unit gross revenue was obscured by factors beyond the control of KNR management such as the setting of appropriate tariffs for the ordinary train services.

5.03 When examining these results it should be borne in mind that KNR's financial performance is analyzed by overly conservative methods. This occurs because Section 4.08 of the Seventh Railway Loan Agreement specifically prohibits the inclusion of Government subsidies in KNR's operating revenues. In reality, this means that KNR is penalized by factors beyond its control because it is forced by Government to operate certain loss making services but then cannot consider the Government subsidies it duly receives as part of its operating revenue. In recognition of this paradox, it was decided during recent negotiations for the Seoul/Busan Corridor Project to include Government subsidies in operating revenues, a practice which is endorsed by the International Accounting Standards Committee. This change in the method of measuring operating revenues will be reflected in the loan agreements for

future projects as well as for ongoing ones such as the Coal and Cement Distribution Project. Using it will make a positive difference in KNR's financial performance; for example if financial statements under the Seventh Railways are thus restated the main indicators would be as follows:

	1979	1980	1981	1982	1983	1984
Net operating revenues (Won billion)	32	4	(5)	19	30	74
Net income (Won billion)	7	(40)	(63)	(40)	(36)	3
Operating ratio	86	98	101	96	94	87
Rate of return	2.9	0.3	0.0	1.0	1.4	3.2

This table reinforces the fact that while performance is still below the Loan Covenant requirements (rates of return of 3.2% in 1980, 5.5% in 1981 and 1982, and 6% thereafter) the railways have actually made progress during a period of little traffic growth.

Tariffs

5.04 The following table shows that, over 1977-81, passenger tariff increases slightly exceeded inflation every year except in 1980, and that by December 1981 they had been increased 6% more than the consumer price index (CPI) during the 4-1/2 year period. Freight tariff increases were below inflation through mid-1980 but then exceeded the CPI substantially for the rest of the period. Coal tariffs, which were historically lower than other freight tariffs, were increased by over 90% between mid-1980 and the end of 1983.

		Tariff indices		
	CPI	Dates of increases	Passenger	Freight
Mid-1977	100	Jan 1977	100	100
Mid-1978	115	Jun 1978	119	115
Mid-1979	135	May 1979	137	127
Mid-1980	175	Jan 1980	164	152
Mid-1981	215	Jun 1981	224	232
Dec 1981	222	Dec 1981	235	259
Mid-1982	232	Jul 1982	240	264
Dec 1983	239	Dec 1983	247	283

However, these increases were generally applied across the board. As a result some rates were still far short of covering costs. The most striking case relates to ordinary passenger trains, tariffs for which were even short of covering variable costs.

Profitability by Service

5.05 The following table illustrates the changes in contribution to total revenue by major passenger service and freight commodity in 1979 and 1983.

	% Contribution to:				Gross rev. per traffic unit (W)		Cost coverage (%)			
	Total revenue		Total cost				Variable Operating		Total	
	1979	1983	1979	1983	1979	1983	1979	1983	1979	1983
Passenger										
Spec. express	5.4	4.1	2.2	2.3	14.5	31.3	288	235	217	148
A/C express	2.7	10.7	2.4	5.5	10.8	19.5	184	275	113	167
Non A/C express	26.5	22.3	14.8	14.2	6.7	13.7	293	229	162	135
Ordinary	8.9	6.5	17.7	20.0	3.2	6.8	93	54	44	28
SMESRS	9.9	10.2	9.2	10.0	4.8	8.5	226	223	96	88
Passenger avg.	60.3	57.7	55.6	58.2	5.6	12.5	200	165	97	85
Freight										
Coal	11.7	16.9	15.3	15.1	6.3	18.0	104	141	68	96
Cement	7.8	9.0	7.6	8.5	7.8	17.9	135	137	96	91
Ores	3.8	3.4	3.0	3.2	6.5	16.1	179	135	108	91
Oil	2.7	2.6	3.7	2.5	6.9	20.9	237	139	67	91
Fertilizer	1.7	1.6	2.6	2.0	6.8	16.1	103	103	61	66
Grain	1.2	0.9	1.5	1.1	6.8	15.8	116	111	69	68
Container	-	1.2	-	0.7	-	17.3	-	220	-	141
Freight avg.	39.7	42.3	44.4	41.8	6.7	17.2	114	131	73	87

5.06 From this table it can be seen that express train services have continued to be the major source of total KNR gross operating revenues by starting at 34.6% in 1979 and rising to 37% of these revenues in 1983. At the same time their costs rose slightly from 19.4% in 1979 to 22% of total costs in 1983. The most improved service in terms of profitability and the best in terms of total cost coverage was the Air Conditioned (A/C) express. Its contribution to total revenue improved from 2.7% in 1979 to 10.7% in 1983; furthermore these revenues exceeded total cost of providing the service by 67%. Ordinary train service has continued to be the major loss maker. In 1979 it contributed 8.9% of total revenues but incurred 17.7% of total costs; this increased over the period and by 1983 it provided 6.5% of total revenues but was responsible for 20% of all costs. In 1983 ordinary train service had

abysmally low cost coverages - only 54% of variable operating cost and an even worse 28% of total costs. Ordinary train service also has the worst unit cost structure in that fixed operating costs and interest charges comprise almost 48% of its total unit costs. Its unit variable operating cost, at 52% of total cost, is the lowest of all services; this stems from the costly, expensive infrastructure needed to maintain this service to so many locations. As a whole, passenger traffic suffered a mild decline both in contributions to gross revenues, from 60% in 1979 down to 58% in 1983, and in terms of total cost coverage from 97% in 1979 down to 85% in 1983.

5.07 Freight traffic has shown considerable improvement. On average, freight traffic revenue covered 87% of total cost in 1983, up considerably from 73% in 1979. Most of the major commodities - coal, cement and ores - had coverages of total costs of over 90% in 1983, and reportedly after the 1984 tariff increases these coverages reached 98%. Coal is still the largest freight contributor to gross revenue; in 1983 it contributed 17% of gross revenues (up from 12% in 1979) and covered 96% of total cost. Container service is very small, contributing about 1.2% of total revenue but highly profitable as it covers 141% of total cost. Freight service as a whole has also gained in total share of KNR revenues up from almost 40% in 1979 to over 42% in 1983. At the same time its contribution to total cost has declined from just over 44% in 1979 to less than 42% in 1983.

5.08 Hence, except for ordinary train service, the overall trend of profitability by service is good. Eventually, ordinary train service will be less of a problem for KNR as it is declining in use. Even though losses on this service will still be incurred, they will have a reduced impact on KNR profitability as increasing shares of total revenues will come from the more profitable services which are experiencing moderate to high growth.

Financial Situation

5.09 KNR operated at a net loss for about 4 years up to 1983; this has resulted in the progressive deterioration of its working capital from a negative Won 3.7 billion in 1977 down to negative Won 80 billion by 1981. Working capital has since improved to an estimated negative W 44.5 billion in 1984, due mainly to tariff increases and the increases in revenue per traffic unit. To cover the deficits in working capital, KNR had to increase its long-term borrowing from local sources which led to substantial interest charges. KNR was therefore not able to achieve the 1.5 ratio of current assets to current liabilities provided for under Section 4.05 of the Loan Agreement.

5.10 The additional borrowing explains the gradual decline of KNR's debt to equity ratio which fell from 32/68 in 1979 to an estimated 38/62 by 1984. This ratio is not expected to decline much further as the KNR investment program will not grow substantially in the near term. In the long term some improvement is expected since, if current trends persist, KNR earnings will continue to grow.

Remedial Action Taken

5.11 At the time of negotiations for this project, the Government had agreed to establish a revised cost-based tariff structure for KNR by December 31, 1984. The agreement has only been partially met but the overall efforts by Government in raising tariffs faster than increases in the consumer price index have helped to curtail KNR losses. The investments included in this project, by providing capacity increases for SMESRS and express services, have also had a pronounced positive effect on KNR revenues. In future, the best strategy for KNR seems to be the one it has already adopted, i.e., the reduction in ordinary trains coupled with the expansion and aggressive marketing of its profitable services.

IV. INSTITUTIONAL DEVELOPMENT

6.01 At the time of appraisal, it was felt that KNR's status as a semi-autonomous agency prevented its management from enjoying the freedom in planning, organizational and financial decision-making needed in dealing with increasingly fierce competition and adapting to abrupt changes in traffic demand and/or economic conditions. Full autonomy seemed to be the solution and a study on how best to prepare KNR for this was carried out under the Fifth (Loan 1101-KO) and Sixth (Loan 1542-KO) Railway Projects. Accordingly agreement was reached at negotiations of the Seventh Project on a timetable for implementing the short- and medium-term measures recommended by the study, with the objective of making KNR a public corporation no later than January 1, 1987. These short- and medium-term measures were to focus on: (a) the establishment of a management information system and an aggressive marketing organization; (b) the strengthening of KNR's capabilities in economic analysis, investment planning, financial management and accounting procedures, with special emphasis on the introduction of performance budgeting and incremental long-term variable costing; and (c) progressive re-organization of KNR's managerial structure in order to ensure a smooth transition to a public organization.

6.02 At negotiations it was also envisaged that the same consulting team (an American firm with Korean partners) who conducted the original study would implement the study findings by 1982. However, KNR and the consulting team disagreed over contract costs and KNR spent the next 20 months trying to convince the American firm to lower its offer. Finally negotiations were broken off in late 1981, and KNR decided to invite bids from other firms. After an eight-month selection process, the contract with the lowest evaluated bidder (another American firm in partnership with a Korean one) was signed on May 24, 1982 and work commenced shortly thereafter. The new consulting team initially made a systematic review of its predecessor's plans and recommendations. This took about six months. They then suggested implementing some of the measures as originally envisaged but also proposed major changes in other areas.

6.03 Implementation of institutional development measures therefore started in 1983, some two and one half years behind schedule. There were still other problems within KNR itself which led to further delays and slowed

implementation. The period from mid-1982 to the end of 1983 was one of instability at KNR with four changes in Directors. This made it difficult for the consulting team to get needed cooperation as the new managements were busy establishing and organizing themselves. The institutional building part of the technical assistance component therefore could not gain full momentum.

6.04 Despite all this, some progress was made and the following measures were fully or partly introduced: (a) the costing system; (b) commercial accounting; (c) electronic data processing; (d) investment planning and budgeting procedures; and (e) periodic seminars for management training. Some actions were postponed by the consulting team (e.g., incremental variable costing) and others were redesigned (the management information system) to suit the changing environment. Finally, in August 1984, the consulting team prepared a new timetable for introducing the management improvement program which will consist of the following among other things: (a) strategic planning; (b) implementation of a cost-based tariff system; (c) performance budgeting; and (d) a management information system. The program will be implemented under the ongoing Coal and Cement Project and the Seoul-Busan Corridor Project. Implementation of the phased, long-term plan should proceed smoothly, given the current relative stability within KNR.

VII. ECONOMIC RE-EVALUATION

7.01 The evaluation at appraisal analyzed separately the economic return on capacity expansion investment in: (a) freight services, (b) passenger services, and (c) suburban rail services. The appraisal's economic evaluation focused on project investments globally and on particular items when possible. The largest investment group, accounting for nearly one half of all project costs, consisted of investments which were primarily intended to increase railway carrying capacity for the types of traffic best suited economically to rail transport. The second group, amounting to 32% of project costs and also consisting of capacity-increasing investments was for suburban passenger services in the Seoul metropolitan area. The remaining project items were for way and structures renewal (10%) and miscellaneous investments (12%).

7.02 The methodology followed for economic re-evaluation was the same as that at appriasal. For ease of comparison, cost and benefit figures were computed in end-1979 prices. The appraisal and recalculated rates of return are listed below; details are given in Tables 7.1 to 7.3.

ECONOMIC RATES OF RETURN (%)

	Best appraisal estimate	Low appraisal estimate	Completion re-evaluation
Capacity increase for freight services	33	29	19
Capacity increase for passenger services	17	16	14
Seoul suburban service	19	17	16
Overall economic evaluation	22	19	15

7.03 The re-evaluated rates are lower mainly because of traffic shortfalls and the use of lower growth rates than at appraisal. As discussed in paras. 4.01-4.07, there was a significant downturn in traffic and hence the newly installed facilities were not fully utilized. In the long term it is expected that all investments will prove worthwhile.

7.04 The benefit streams were computed according to the various categories of investments. For freight, the capacity expansion benefits were measured in terms of the transport cost savings for the overall economy, calculated as the difference between the economic cost of rail transport and the economic cost of the next best (highway) mode. For passenger service, the capacity increase provided better quality special and limited express train services. The economic costs of these services are slightly lower than bus costs because rail services, when used to capacity in Korea, consume less fuel per passenger-km than buses. The benefits of increasing the capacity of the better quality passenger services were therefore measured in terms of people's willingness to pay for the services over and above their financial costs. For the suburban services, the benefits of increasing service were expressed in terms of transport cost savings from the alternative mode, mostly buses and cars. This benefit calculation was particularly conservative because it does not include the higher costs of some diverted trips which may be made by taxis or private cars, nor savings in road passenger time which would be affected by the increased congestion which a bus transport alternative would impose on the already busy streets.

VIII. THE ROLE OF THE BANK

8.01 The project continued the dialogue between the Government and the Bank, which had been ongoing under the previous six projects. This has resulted in further growth and development of KNR as an institution. Project-assisted studies and technical assistance have also enabled the Government and KNR to begin addressing financial issues as well as to better define KNR's role in a future to be dominated by a multimodal transport outlook.

8.02 Regarding KNR's financial performance, although there is an accumulated deficit, the deficit is due to the ordinary trains which KNR is forced to run on social service grounds. In areas where more managerial freedom is allowed and more appropriate tariff policies are followed, KNR's efficiency and productivity have grown to new highs. The Bank has been a catalyst for change in these areas, specifically by assisting in the use of traffic costing systems to identify which services to encourage or discourage and then placing an emphasis on investments for services in the first category. This should lead in the long-term to a profitable, well run organization.

8.03 The multimodal approach is a product of rapid changes in the Korean transport situation and the overall loss in market shares by KNR to highway transport. KNR had proposed building a new High Speed Train (HST) from Seoul to Busan as a way of providing frequent, high quality service in this corridor and hopefully offset the losses in market shares (para. 3.14). The Bank was able to persuade KNR to conduct multimodal studies which examined the least-cost alternative of providing mass passenger and freight transport in the Seoul region as well as the Seoul-Busan corridor. Out of these studies have come a more balanced approach to transport planning in Korea as well as proposals for specific road and rail investments. The Bank's role has therefore been critical to development of transport policy in KNR and Korea as a whole. Since this was a first effort at a multimodal approach in Korea, there were of course problems in coordination between all of the agencies concerned in setting terms of reference, selecting consultants, reviewing the various phases of the studies, etc. But it can be judged as well done and such studies will form important parts of subsequent projects.

IX. CONCLUSIONS

9.01 The project has achieved its overall objectives of increasing KNR's capacity to handle growing express passenger and freight services and curtailing losses on ordinary trains. It has also paved the way for extensive changes in KNR itself, with its emphasis on management, planning, costing and economic analysis. The KNR implementation capability was excellent, and although the economic and financial returns from the investments were not as high as expected, this was due to problems in the economy as a whole and, to some extent, Government's social policy. The project was probably most valuable in providing the impetus for a turnaround in KNR's financial and managerial performance.

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Table 3.1

KOREA

RAILWAYS VII (LOAN 1836-KO)

PROJECT COMPLETION REPORT

Procurement Schedule for Bank-Financed Items
(as of December 1984)

		Events						
		I	II	III	IV	V	VI	VII
Rails (33,800 tons)	Original schedule	04/15/80	05/01/80	06/15/80	07/15/80	08/01/80	12/01/80	12/01/81
	Actual	07/07/80	07/14/80	09/26/80	12/02/80	12/10/80	02/26/81	12/31/81
Track maintenance equipment	Original schedule	07/15/80	08/01/80	09/15/80	10/15/80	11/01/80	03/01/81	05/01/81
	Revised schedule				05/01/81	05/15/81	10/01/81	04/01/82
	Actual	06/19/80	06/26/80	02/19/81	06/02/81	06/10/81	09/24/81	10/09/82
Track material workshop equipment	Original schedule	11/15/80	12/01/80	01/15/81	02/15/81	03/01/81	07/01/81	10/01/81
	Revised schedule				05/01/81	05/15/81	10/01/81	04/01/82
	Actual	06/19/80	06/26/80	02/19/81	06/02/81	06/10/81	08/18/81	02/20/82
Breakdown cranes (2)	Original schedule	06/15/80	07/01/80	08/15/80	09/15/80	10/01/80	10/01/81	10/01/81
	Actual	07/15/80	09/03/80	12/26/80	08/11/81	04/27/81	05/19/82	05/19/82
Special express passenger cars (20)	Original schedule	06/15/80	07/01/80	08/15/80	09/15/80	10/01/80	04/01/81	07/01/81
	Revised schedule				05/01/81	05/15/81	11/15/81	12/09/82
	Actual	07/12/80	07/14/80	12/24/80	06/02/81	06/09/81	01/15/82	12/09/82
Limited express air-conditioned passenger cars (56)	Original schedule	06/15/80	07/01/80	08/15/80	09/15/80	10/01/80	04/01/81	07/01/81
	Revised schedule				05/01/81	05/15/81	11/15/81	12/09/82
	Actual	07/12/80	07/14/80	12/24/80	06/02/81	06/09/81	07/14/81	05/25/82
Limited express regular passenger cars (170)	Original schedule	04/15/80	05/01/80	06/15/80	07/15/80	08/01/80	12/01/80	07/01/80
	Revised schedule				05/01/81	05/15/80	11/15/81	12/09/82
	Actual	07/12/80	07/14/80	12/24/80	06/02/81	06/09/81	08/24/81	12/26/81
Freight cars (100)	Original schedule	06/15/80	07/01/80	08/15/80	09/15/80	10/01/80	06/01/81	04/01/81
	Revised schedule							
	Actual	10/08/80	11/19/80	03/13/81	07/13/81	07/22/81	12/25/81	07/15/82
Rolling stock workshop equipment	Original schedule	08/15/80	09/01/80	10/15/80	11/15/80	12/01/80	04/01/81	07/01/81
	Revised schedule			03/01/81	04/22/81	05/01/81	10/15/81	05/07/82
	Actual	06/19/80	06/25/80	03/06/81	04/22/81	05/07/81	09/04/81	06/10/82
The following items are additional to the original procurement schedule:								
Rails (2,052 tons)	Actual	12/14/82	04/11/83	06/10/83	01/04/84	01/09/84	12/11/84	02/06/85
Rails (750 tons)	Actual	03/06/84	05/12/84	07/12/84	08/08/84	08/08/84	02/23/85	03/25/85
Track maintenance equipment	Actual	11/12/81	12/17/81	05/12/82	06/02/82	06/04/82	09/03/82	07/20/83
Power source cars (3)	Actual	02/02/82	02/05/82	02/26/82	07/09/82	07/13/82	04/15/83	04/15/83
Power source cars (3)	Actual	03/06/84	05/12/84	07/12/84	12/24/84	12/28/84	01/13/85	01/15/85

Note: Events: I - Bank's agreement on tender documents, II - bid invitation, III - bid opening (price quotation), IV - Bank's agreement to award of contract, V - contract date, VI - start of delivery, VII - completion of delivery.

KOREA

RAILWAYS VII (LOAN 1836-KO)

PROJECT COMPLETION REPORT

Status of Procurement of Bank Financed Items
(As of September 1984)

Item	Loan amount (US$ mln)	Contract Date	Contract Number	Contract Amount C.I.F. In contract currency	Contract Amount C.I.F. In US$ equivalent	Contractor	Shipping Date Contracted First	Shipping Date Contracted Last	Shipping Date Actual First	Shipping Date Actual Last	CIF value shipped US$ equivalent	CIF value shipped % of total
Rails and Track Maintenance Equipment												
Rails (33,800 tons)	14.35	12/10/80	802658-F3	$13,092,224	13,092,224	Kangnon Ind.	02/26/81	12/31/81	02/04/81	12/29/81	13,105,387.04	100
		12/10/80	802659-F3	$3,407,310	3,407,310	Mistui & Co.	-	09/15/81	04/30/81	07/08/81	3,404,492.59	100
		10/31/81	813072-F3	$1,980,576	1,980,576	Kangnon Ind. Co.	-	02/20/82	02/13/82	02/13/82	1,974,202.99	100
Rails (2,052 tons) - add'L.		01/09/84	840004-F3	W 1,063,026,288	1,367,764	Kangnon Ind. Co.	-	07/08/84	-	-	-	0
Rails (750 tons) - add'L.		08/08/84	841302-F3	W 388,533,000	479,019	Kangnon Ind. Co.	-	12/31/84	-	-	-	0
Track maintenance equipment	3.50	06/10/81	811215-F3	Ash 34,238,147.50	2,713,858.02	German Engineering	-	01/30/82	11/22/81	01/29/82	2,108,578.63	100
		"	811216-F3	Sfr 1,337,414.40	818,721.19	Kilter Engineering	-	07/20/82	10/09/82	11/02/82	452,586.32	100
		"	811217-F3	$58,278	58,278	Moritani & Co.	-	10/20/81	09/24/81	09/24/81	57,469.67	100
		"	811218-F3	$81,782	81,782	Daewoo Ind. & Co.	-	11/20/81	11/18/81	11/18/81	81,126.61	100
Track maintenance equipment - add'L.		06/04/82	822820-F3	Y 23,669,442	1,407,478.93	German Engineering	-	01/20/83	12/17/82	03/09/83	1,372,754.30	100
		"	822821-F3	$610,700	610,700	Seongil Trading	-	07/20/83	07/04/83	07/20/83	613,284.74	100
		"	822822-F3	$42,351	42,351	Dongil Commerce	-	09/20/82	09/03/82	10/29/82	41,680.32	100
Track material workshop equipment	0.50	06/10/82	811219-F3	$36,302,000	710,649.27	Hanil Commerce	11/20/81	02/20/82	11/13/81	11/30/81	166,150.64	100
		"	811220-F3	W 59,460,000	95,949.66	"	-	12/20/81	12/19/81	02/20/82	79,852.66	100
		"	811221-F3	W 1,750,000	2,823.94	"	-	09/20/81	09/25/81	09/25/81	2,549.42	100
		"	811222-F3	$8,412	8,412	Hasan Trading	-	08/20/81	08/18/81	08/18/81	8,412.00	100
		"	811223-F3	$3,455	3,445	Seongil Trading	-	12/20/81	11/05/81	11/05/81	8,412.00	100
		"	811224-F3	$24,701.50	24,701.50	Hasan Trading	-	09/20/81	10/24/81	10/24/81	3,433.14	100
		"	811225-F3	$15,340	15,340	"	-	10/20/81	10/16/81	10/16/81	15,461.61	100
		07/10/81	811585-F3	DM 247,243	107,711.32	Seongil Trading	-	01/15/82	12/10/81	12/10/81	106,718.17	100
		"	811586-F3	$70,469.86	70,469.86	"	-	11/15/81	08/31/81	08/31/81	70,469.86	100
Subtotal	18.35				26,559,574.69						23,687,288.57	

Item	Loan amount (US$ mln)	Contract Date	Contract Number	Amount C.I.F. In contract currency	Amount C.I.F. In US$ equivalent	Contractor	Shipping Date Contracted First	Shipping Date Contracted Last	Shipping Date Actual First	Shipping Date Actual Last	CIF value shipped US$ equivalent	CIF value shipped % of total
Rolling Stock												
Breakdown cranes (2)	1.55	04/27/81	810809-F3	¥ 320,353,528	1,520,447.50	Marubeni Corp.	-	04/15/82	05/19/82	05/19/82	1,275,097.62	100
Special express cars (20)	6.60	06/09/81	811193-F3	$6,545,562	6,545,562	Ssangyong Corp.	10/25/82	01/25/83	01/15/82	12/28/82	6,602,055.00	100
Limited express air cond. cars (56)	14.40	06/09/81	811193-F3	$14,939,695	14,939,695	"	04/25/82	11/25/82	07/14/81	05/25/82	15,060,978.20	100
Limited express regular cars (170)	28.00	"	811678-F3	$29,446,240	29,446,240	"	-	11/25/82	08/24/81	12/26/81	29,265,992.08	100
Cement tank cars (100)	3.30	07/22/81	811678-F3	$4,576,400	4,576,400	"	-	08/30/82	12/25/81	07/15/82	4,561,613.35	100
Limited express power source cars (3)		07/13/82	824129-F3	$1,827,480	1,827,480	"	-	06/20/83	04/15/83	04/15/83	1,826,615.63	100
Subtotal	55.85				58,855,824.50						58,592,351.88	
Rolling Stock - Workshop Equipment												
Workshop equipment	2.08	05/07/81	810928-F3	¥ 110,402,600	504,794.62	Hanil Commerce	01/10/82	07/10/82	09/10/81	01/18/82	482,595.11	100
		"	810930-F3	¥ 25,071,000	114,632.30	Taewon Trading	-	01/30/82	10/27/81	10/27/81	109,572.10	100
		"	810932-F3	$235,862	235,862	Tae Rim Trading	-	10/25/81	09/04/81	09/04/81	235,862.00	100
		"	810933-F3	$484,404	484,404	Taewon Trading	-	06/10/82	-	06/10/82	491,278.39	100
		"	810934-F3	$54,638,460	249,823.79	Yamanen Co.	-	02/28/82	12/20/81	12/20/81	245,036.19	100
		"	810935-F3	$381,420	381,420	O-Yang Commercial	-	11/28/81	11/28/81	11/28/81	378,475.22	100
		06/24/81	811444-F3	¥ 13,156,000	64,597.22	Marubeni Corp.	-	03/30/82	04/28/82	04/28/82	54,019.09	100
		"	811445-F3	¥ 46,520,000	228,417.72	Hanil Commerce	-	02/28/82	02/06/82	02/06/82	198,752.61	100
Subtotal	2.08				2,263,951.45						2,195,590.71	
Training and Consultants Services												
Consultant services					1,378,185						1,353,796.17	
Staff training					265,076						197,185.85	
Subtotal	190				1,643,261						1,550,982.02	94
Unallocated	12.02				-						-	
Total	88.20				88,819,422.64						86,026,213.18	97

KOREA

RAILWAYS VII (LOAN 1836-KO)

PROJECT COMPLETION REPORT

Total Project Cost
(Won million)

Categories	Appraisal estimate			Revised estimate (1981)			Actual cost (1980-84)/a		
	L	F	T	L	F	T	L	F	T
KNR Investments Starting in 1980/81									
New line construction	7,330	-	7,330	-	-	-	-	-	-
Increase in line & station capacity	76,385	17,510	93,895	40,454	-	40,454	39,608	2,137	41,765
Way & structures	21,520	10,645	32,165	27,337	13,454	40,791	31,745	16,661	48,136
Motive power & rolling stock	63,895	39,815	103,710	66,419	45,565	111,984	61,396	58,593	119,989
Repair facilities	11,265	1,870	13,135	11,145	1,522	12,667	49,545	1,811	51,356
Telecom, power, buildings, etc.	8,145	4,670	12,815	12,873	2,350	15,223	12,108	1,610	13,718
Subtotal	188,540	74,510	263,050	158,228	62,891	221,119	194,132	80,812	274,944
Physical contingencies	10,119	2,626	12,745	-	-	-	-	-	-
Price contingencies	58,513	12,806	71,319	9,537	2,809	12,346	-	-	-
Total - Part A	257,172	89,942	347,114	167,765	65,700	233,465	194,132	80,812	274,944
Training and Technical Assistance for the Government									
Training, transportation planning	-	115	115	-	115	115	-	107	107
Tech. assistance, feasibility studies	-	1,740	1,740	-	1,740	1,740	-	756	756
Tech. assistance, urban studies	-	1,510	1,510	-	1,510	1,510	-	1,450	1,450
Total Part B	-	3,365	3,365	-	3,365	3,365	-	2,313	2,313
Grand Total	257,172	93,302	350,479	167,765	69,065	238,830	194,132	83,125	277,257
Grand Total in US$ Million /b	443.3	160.9	604.3	257.8	106.1	366.9	287.6	123.2	410.8

/a At December 31, 1984. Figures for 1980-84 actual are in current terms. Costs should therefore be compared with appraisal estimates including contingencies.
/b US$1.00 = W 485 at appraisal, W 651.0 at time of project revision, and W 675 over project lifetime.

Table 3.3

Table 3.4

KOREA

RAILWAYS VII (LOAN 1836-KO)

PROJECT COMPLETION REPORT

Estimated and Actual Disbursements
(US$ million)

IBRD fiscal year and quarter	Appraisal estimate	Actual total disbursement	Actual disbursements (%)
1980/81			
To 09/30/80	0.2		0
To 12/31/80	7.5		0
To 03/31/81	22.0	4.2	19
To 06/30/81	52.0	9.8	19
1981/82			
To 09/30/81	74.0	32.4	44
To 12/31/81	84.0	54.5	65
To 03/31/82	87.5	71.5	82
To 06/30/82	89.5	75.3	84
1982/83			
To 09/30/82	91.0	77.5	85
To 12/31/82	92.5	82.5	89
To 03/31/83	93.5	83.8	90
To 06/30/83	94.0	86.1	92
1983/84			
To 09/30/83	94.0	87.2	93
To 12/31/83		87.9	94
To 03/31/84		89.9	96
To 06/30/84		92.0	97
1984/85			
To 09/30/84		92.2	98
To 12/31/84		92.2	98
Closing date	12/31/83	12/31/84	

Table 3.5
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KOREA

RAILWAYS VII (LOAN 1836-KO)

PROJECT COMPLETION REPORT

Compliance with Covenants in the Loan Agreement

Action required	Action taken
Section 3.02 (a) The Borrower shall, not later than January 1, 1987 or such other date as shall be agreed with the Bank, take all such action as shall be necessary to establish KNR as a public corporation under the laws of the Borrower with powers, inter alia, (i) to incur debt, (ii) to fix the emoluments of its staff, (iii) to prepare and submit to MOT and EPB its proposed budgets in a commercial form, (iv) to have reasonable flexibility in adjusting approved operating budgets to meet cost changes arising out of unexpected fluctuations in railroad traffic, (v) to open and maintain an account with the Bank of Korea for revenue receipts and payments of obligations, (vi) to maintain its records in accordance with commercial accounting procedures, and (vii) to make proposals relating to its tariff structure.	Action not yet due.
(b) The Borrower shall implement such measures as shall be agreed with the Bank as a first phase toward meeting the objectives referred to in paragraph (a) of this Section.	Action not yet due.

Table 3.5
Page 2

Action required	Action taken
(c) The Borrower shall, not later than January 1, 1984 or such other date as shall be agreed with the Bank, furnish to the Bank for review a report on the measures taken and a plan for additional measures, both legal and organizational, to be taken to meet the objectives referred to in paragaraph (a) of this section.	Plan provided in August 1984.
Section 3.04 In order to assist KNR in carrying out Part G of the Project, the Borrower shall cause KNR to employ consultants whose qualifications, experience and terms and conditions of employment shall be satisfactory to the Bank.	Refers to the implementation of the management study carried out under the Fifth Railway Project. An American firm in association with a Korean firm was selected. The contract between KNR and the consultants' partnership was signed and approved by the Bank on May 24, 1982.
Section 3.08 The Borrower shall: (a) complete and furnish to the Bank for review, not later than June 30, 1982, feasibility studies, by consultants whose qualifications and terms of reference are acceptable to the Bank, of future transport investment projects for the period 1982-86; and (b) implement thereafter such recommendations as shall be agreed with the Bank.	These studies were to be carried out on the basis of recommendations made in the Comprehensive Transport Study, which was not successfully completed. The Government and the Bank have agreed that the following studies be conducted (a) Seoul-Busan transport corridor (completed in late 1984) and (b) the Kyonggi Region transport (due for completion in early 1985).
Section 3.09 The Borrower shall: (a) complete and furnish to the Bank for review, not later than June 30, 1982, a study, by consultants whose qualifications and terms of reference are acceptable to the Bank, of the urban transport needs of the greater Seoul, Busan and other areas; and (b) implement thereafter such recommendations as shall be agreed with the Bank.	The Seoul Study was completed in 1984, the Busan Study is under way and due for completion in May 1985; the Secondary Cities Study started in late 1984 and is due for completion in mid-1985.

Table 3.5
Page 3

Action required	Action taken
Section 3.10 The Borrower shall, not later than June 30, 1983, take all such action in consultation with the Bank as shall be necessary to train the Borrower's staff in transport planning and coordination.	Completed: six trainees were selected in early December 1981. Most of the training was provided in the USA.
Section 4.02 (a) Standard accounting convenant.	Complied with.
(b) Standard audit convenant.	Complied with.
Section 4.04 The Borrower shall cause KNR not later than December 31, 1984 to establish a revised tariff structure acceptable to the Bank.	Satisfactory action has been taken.
Section 4.05 The Borrower shall cause KNR to take all necessary measures as shall be required by KNR to maintain working capital satisfactory to the Bank, including attaining by December 31, 1983 a ratio of current assets to current liabilities of not less than 1.5 and maintaining such ratio thereafter.	Superseded by Section 4.08 of Loan Agreement 2267-KO.
Section 4.06 (a) The Borrower shall take or cause to be taken all action necessary to ensure that substantial changes in KNR's Investment Plan shall only be made with the concurrence of the Bank.	The Government took the decision in 1981 to double the Iri-Songjeongri section (101 km) of the Honam line at an estimated total cost of Won 152 billion ($227 million). Since only Won 8 billion ($12 million) were spent in 1981, which was the last year of KNR's 1977-81 investment plan, the decision did not involve a formal substantial change as defined in the Loan Agreement.
(b) For the purposes of this Section "substantial changes" shall mean changes involving in the aggregate either an increase or a decrease of more than 20 billion Won in the estimated cost of the Investment Plan.	Superseded by Section 4.11 of Loan Agreement 2267-KO.

Table 3.5
Page 4

Action required	Action taken
Section 4.06 (a) Except as the Bank shall otherwise agree, KNR, or the Borrower acting on behalf of KNR, shall not incur any long-term debt unless the net revenues of KNR for the fiscal year next preceding such incurrence, or for a later 12-month period ended prior to such incurrence, whichever amount is greater, shall be not less than 1.1 times the maximum debt service requirements for any succeeding fiscal year on all long-term debt then outstanding (including the long-term debt to be incurred).	Superseded by Section 4.09 of Loan Agreement 2267-KO.
Section 4.08 The Borrower shall cause KNR to take all necessary measures (including but not limited to KNR's tariff increase) satisfactory to the Bank as shall be required by KNR to: (a) cover its operating costs (excluding depreciation) and debt service requirements and finance a reasonable proprotion of its capital expenditures commencing fiscal year 1980; and (b) earn an annual rate of return of not less than (i) 3.2% in fiscal year 1980, (ii) 5.5% in fiscal year 1981 and 1982, and (iii) 6% thereafter.	Superseded by Section 4.07 of Loan Agreement 2267-KO.
Section 4.10 Except as the Bank shall otherwise agree, the Borrower shall cause KNR to carry out a revaluation of KNR's fixed assets on an annual basis, in accordance with appropriate and consistently maintained methods of valuation acceptable to the Bank.	Complied with.

Table 3.6

KOREA

RAILWAYS VII (LOAN 1836-KO)

PROJECT COMPLETION REPORT

Loan Financed Items

	Unit	Quantity	Unit Cost (US$)	Total Cost (US$ M)
A. KNR Project				
1. Rails, 50 kg/m, for renewal	tons	25,802	559	14.42
2. Rails, 60 kg/m, for renewal	tons	10,800	547	5.91
3. Track maintenance equipment	ea	12		4.73
4. Track material workshop equipment	ea	18		0.48
5. Breakdown cranes	no.	2	640,000	1.28
6. Passenger Cars				
Special express coaches	no.	20	330,000	6.54
Limited express air cond. coaches	no.	43	220,000	9.40
Limited express air cond. dining cars	no.	6	276,000	1.66
Limited express power source cars	no.	13	524,000	6.92
Limited express regul - coaches	no.	170	172,000	29.26
7. Freight cars	no.	100	45,600	4.56
8 Motive Power and Rolling Stock Workshop equipment	ea	11		2.19
9. Training and technical assistance	-	-	-	1.55
TOTAL	-	-	-	88.90
B. Government				
1. Transport sector studies				1.06
2. Urban studies				2.03
3. Training MOT				0.15
Total Government				3.24
GRAND TOTAL				92.14

Table 4.1

KOREA

RAILWAYS VII (LOAN 1836-KO)

PROJECT COMPLETION REPORT

KNR Freight Traffic: 1966-84 Actual
(Million tons)

	Major commodities							Others					
	Coal	Cement	Ore	Oil	Fertilizer	Grain	Subtotal	General cargo	Private car return	Container	Military	KNR	Total
Actual													
1966	10.50	1.70	1.10	0.90	1.20	1.20	16.60	4.40	-	-	2.10	0.90	24.00
Second FYP													
1967	11.20	2.20	1.40	1.40	1.20	1.30	18.70	5.60	-	-	2.30	0.80	27.40
1968	9.70	3.20	1.70	1.70	1.50	1.60	19.40	5.90	-	-	2.80	1.00	29.10
1969	10.40	4.40	1.70	2.10	1.20	1.40	21.20	5.60	-	-	2.70	1.20	30.70
1970	12.10	4.90	1.80	2.40	1.10	1.30	23.60	5.00	-	-	2.10	1.00	31.70
1971	12.20	5.80	1.60	2.50	1.10	1.40	24.60	4.60	-	-	1.90	0.90	32.00
Third FYP													
1972	11.30	6.00	1.50	2.20	1.30	1.60	23.90	4.60	-	-	2.40	0.70	31.60
1973	13.60	7.50	2.30	2.70	1.50	1.60	29.20	5.50	-	0.20	1.70	1.00	37.60
1974	15.10	7.80	2.90	2.70	1.90	1.30	31.70	5.10	-	0.20	1.30	1.10	39.40
1975	16.70	9.00	3.00	3.10	2.20	1.00	35.00	3.50	1.50	0.20	1.40	1.10	42.70
1976	16.10	10.20	3.40	3.10	1.80	1.30	35.90	3.20	1.60	0.30	1.50	1.30	43.80
Fourth FYP													
1977	17.50	10.30	3.20	3.50	2.10	1.20	37.80	4.60	1.90	0.50	1.50	1.30	47.60
1978	17.90	10.90	3.10	3.80	2.20	1.20	39.10	4.80	2.00	0.60	1.50	1.60	49.60
1979	18.00	11.20	3.40	4.30	2.10	1.10	40.10	4.70	2.00	0.60	1.50	2.00	50.90
1980	18.60	9.80	3.40	3.90	1.70	1.00	38.40	4.80	1.80	0.40	1.40	2.20	49.00
1981	21.40	8.40	3.90	3.20	1.90	0.60	39.40	4.40	1.60	0.50	1.30	1.60	48.80
Fifth FYP													
1982	19.60	9.50	3.90	2.70	1.80	0.60	38.10	4.30	1.50	0.60	1.40	1.50	47.40
1983	20.10	11.10	4.10	2.60	1.60	0.70	40.20	4.70	1.60	0.80	1.40	1.60	50.50
1984	23.20	10.90	4.30	2.90	1.60	0.70	43.60	4.60	1.60	0.80	1.40	1.70	53.70

Note: Since 1977, general cargo includes slag and gypsum previously included under ore. Slag and gypsum accounted for 0.8 million tons in 1977 and 1.1 million tons in 1979. Return of private cars, mostly oil tankers, are now shown separately from general cargo. KNR charges half the tare weight at Class III freight rate for this traffic.

Source: KNR.

Table 4.2

KOREA

RAILWAYS VII (LOAN 1836-KO)

PROJECT COMPLETION REPORT

Rail Freight Traffic: 1966-84 Actual
(Million ton-km)

	Major commodities							Others					
Years	Coal	Cement	Ore	Oil	Ferti-lizer	Grain	Sub-total	General cargo	Private car return	Con-tainer	Mili-tary	KNR	Total
Actual													
1966	2,077	476	269	238	187	328	3,575	1,180	-	-	403	29	5,450
Second FYP													
1967	2,306	565	335	423	202	338	4,169	1,472	-	-	454	83	6,178
1968	2,125	845	368	589	312	406	4,645	1,577	-	-	548	97	6,867
1969	2,397	911	402	624	330	384	5,048	1,602	-	-	553	125	7,328
1970	2,785	1,003	453	641	312	402	5,595	1,526	-	-	439	148	7,709
1971	2,861	1,222	435	648	344	403	5,913	1,281	-	-	449	198	7,841
Third FYP													
1972	2,613	1,126	347	574	347	402	5,337	1,172	-	-	575	157	7,241
1973	3,194	1,344	568	568	420	381	6,475	1,414	-	72	433	197	8,591
1974	3,396	1,336	751	579	525	334	6,921	1,433	-	85	357	209	9,005
1975	3,677	1,437	760	625	590	256	7,345	960	304	92	385	207	9,293
1976	3,654	1,804	889	638	516	352	7,854	858	280	110	399	227	9,728
Fourth FYP													
1977	3,933	1,781	785	732	561	289	8,081	1,290	308	232	383	215	10,509
1978	3,963	1,846	741	868	595	338	8,351	1,338	358	275	376	228	10,926
1979	3,829	2,085	817	931	525	351	8,538	1,240	382	254	411	256	11,081
1980	3,943	2,018	1,798	833	461	310	8,363	1,249	352	179	406	249	10,798
1981	4,413	1,793	963	660	488	158	8,475	1,257	303	229	374	177	10,815
Fifth FYP													
1982	4,220	2,069	960	590	503	215	8,557	1,486	-	280	395	171	10,892
1983	4,413	2,366	997	595	458	256	9,085	1,678	-	328	365	173	11,629
1984	4,797	2,339	1,062	643	467	232	9,540	1,591	-	347	367	188	12,033

Note: Until 1975, return of private cars and containers were included in general cargo.

Source: KNR and Bank.

Table 4.3

KOREA

RAILWAYS VII (LOAN 1836-KO)

PROJECT COMPLETION REPORT

Rail Freight Traffic: 1966-84 Actual
(Average distance in km)

	Major commodities						Others					
Years	Coal	Cement	Ore	Oil	Fertilizer	Grain	General cargo	Private car return	Container	Military	KNR	Total
Actual												
1966	208	284	250	344	160	267	268	-	-	192	170	227
Second FYP												
1967	206	257	239	302	168	260	263	-	-	197	104	
1968	219	264	216	346	208	254	267	-	-	196	97	
1969	321	207	236	297	275	274	286	-	-	205	104	
1970	230	205	252	267	284	309	305	-	-	209	148	
1971	233	211	265	293	303	289	279	-	-	234	113	245
Third FYP												
1972	232	188	231	265	267	244	258	-	446	242	150	230
1973	235	179	247	239	273	238	255	-	439	260	147	228
1974	226	171	255	240	278	265	262	-	440	273	151	227
1975	221	160	257	223	268	256	279	185	439	270	144	217
1976	228	177	261	224	287	273	276	170	439	270	148	223
Fourth FYP												
1977	225	171	251	224	258	251	279	169	440	258	131	221
1978	221	170	242	229	262	277	277	183	440	260	139	220
1979	213	187	239	217	254	305	264	190	438	269	127	218
1980	212	205	238	213	270	315	264	194	440	283	112	220
1981	206	213	247	206	257	263	286	189	458	288	111	222
Fifth FYP												
1982	215	217	246	218	279	358	-	-	466	282	114	229
1983	219	213	243	229	286	319	258	-	410	261	116	230
1984	206	215	247	222	292	330	257	-	434	262	111	224

Source: KNR and Bank.

KOREA

RAILWAYS VII PROJECT (LOAN 1836-KO)

PROJECT COMPLETION REPORT

KNR Intercity Passenger Traffic: 1966-84 Actual

	Number of passengers (million)				Passenger-km (million)				Average distance (km)			
	Commuter	Long distance	Military	Total	Commuter	Long distance	Military	Total	Commuter	Long distance	Military	Total
Actual												
1966	38.40	98.00	1.90	138.30	830	7,288	546	8,664	21.61	74.37	287.37	62.65
Second FYP												
1967	41.60	108.40	1.90	151.90	883	8,150	543	9,576	21.23	75.18	285.79	63.04
1968	38.70	110.60	1.60	150.90	828	9,280	482	10,590	21.40	83.91	301.25	70.18
1969	37.90	114.80	2.00	154.70	799	9,680	598	11,077	21.08	84.32	299.00	71.60
1970	38.20	91.40	1.70	131.30	854	8,425	539	9,818	22.36	92.18	317.06	74.78
1971	41.40	85.20	1.60	128.20	940	7,300	510	8,750	22.71	85.68	318.75	68.25
Third FYP												
1972	26.30	109.20	1.60	137.10	629	8,914	519	10,062	23.92	81.63	324.38	73.39
1973	22.50	118.90	1.60	143.00	552	9,681	487	10,720	24.53	81.42	304.38	74.97
1974	20.60	117.60	1.60	139.80	481	9,581	471	10,533	23.35	81.47	294.38	75.34
1975	15.10	122.00	1.40	138.50	326	10,626	434	11,386	21.59	87.10	310.00	82.21
1976	17.20	130.10	1.30	148.60	367	11,678	395	12,440	21.34	89.76	303.85	83.71
Fourth FYP												
1977	17.40	143.50	1.30	162.20	380	13,782	401	14,563	21.84	96.04	308.46	89.78
1978	18.20	155.70	1.70	175.60	402	15,670	516	16,588	22.09	100.64	303.53	94.46
1979	19.60	162.10	1.30	183.00	434	16,253	399	17,086	22.14	100.27	306.92	93.37
1980	18.90	164.90	1.20	185.00	428	16,376	400	17,204	22.65	99.31	333.33	92.99
1981	18.00	153.50	1.30	172.80	410	15,740	403	16,553	22.78	102.54	310.00	95.79
Fifth FYP												
1982	17.00	143.30	1.20	161.50	405	15,051	381	15,837	23.82	105.03	317.50	98.06
1983	16.30	136.30	1.00	153.60	400	15,363	310	16,073	24.50	112.66	310.00	104.57
1984	14.60	131.10	1.40	147.10	376	15,190	396	15,962	25.70	115.90	283.10	108.50

Source: KNR/Bank.

KOREA

RAILWAYS VII PROJECT (LOAN 1836-KO)

PROJECT COMPLETION REPORT

KNR Long-Distance Intercity Passenger Traffic by Type of Service - 1971-84 Actual

	Number of passengers (million)							Passenger-km (million)							Average distance (km)						
		Limited express							Limited express							Limited express						
	Spec. exp.	A/C	Non-A/C	Sub-total	Ord. exp.	Ord.	Total	Spec. exp.	A/C	Non-A/C	Sub-total	Ord. exp.	Ord.	Total	Spec. exp.	A/C	Non-A/C	Sub-total	Ord. exp.	Ord.	Total
Actual																					
1971	0.30	-	3.80	3.80	-	81.70	85.80	117	-	1,071	1,071	-	6,112	7,300	390	-	282	282	-	75	85
Third FYP																					
1972	0.40	-	5.90	5.90	-	102.90	109.20	47	-	1,653	1,653	-	7,115	8,915	368	-	280	280	-	69	82
1973	0.50	-	7.60	7.60	-	110.80	118.90	183	-	2,105	2,105	-	7,395	9,681	366	-	277	277	-	67	81
1974	0.60	-	8.80	8.80	4.40	103.80	117.60	234	-	2,224	2,224	940	6,183	9,581	390	-	253	253	214	60	81
1975	0.80	-	11.50	11.50	4.70	104.80	121.80	298	-	2,862	2,862	1,004	6,463	10,627	373	-	249	249	214	62	87
1976	1.30	-	15.00	15.00	5.40	108.30	130.00	465	-	3,673	3,673	1,025	6,516	11,679	358	-	245	245	190	60	90
Fourth FYP																					
1977	1.60	0.40	27.40	27.80	8.50	105.60	143.50	550	122	6,291	6,413	1,357	5,463	13,783	344	305	230	231	160	52	96
1978	1.90	1.60	34.40	36.00	9.40	108.40	155.70	645	461	7,852	8,313	1,287	5,425	15,670	339	288	228	231	137	50	101
1979	2.40	2.00	36.10	38.10	8.70	112.90	162.10	772	530	8,252	8,782	1,207	5,492	16,253	322	265	229	230	139	49	100
1980	2.50	3.00	34.30	37.30	9.00	116.10	164.90	797	727	7,739	8,466	1,230	5,883	16,376	319	242	226	227	137	51	99
1981	2.20	8.80	30.90	39.70	5.30	106.30	153.50	722	2,040	6,793	8,833	616	5,569	15,740	328	232	220	222	116	52	103
Fifth FYP																					
1982	1.90	9.70	33.40	43.10	0.40	97.90	143.30	641	2,210	6,984	9,194	47	5,169	15,051	337	228	209	213	118	53	105
1983	1.90	10.80	37.90	48.70	-	85.90	136.50	607	2,585	7,680	10,265	-	4,491	15,362	319	239	203	211	-	52	113
1984	1.90	13.10	40.70	53.80	-	75.40	131.10	589	3,070	7,947	11,017	-	3,582	15,190	313	234	195	206	-	47	116

Source: KNR/Bank.

Table 4.5

Table 4.6

KOREA

RAILWAYS VII PROJECT (LOAN 1836-KO)

PROJECT COMPLETION REPORT

KNR Seoul Urban (SMESRS) Passenger Traffic - 1971-84 Actual

	Number of passengers (million)			Passenger-km (million)	Average distance (km)
	Commuter	Noncommuter	Total		
Actual					
1974	5.90	22.70	28.60	545	19.06
1975	17.10	65.30	82.40	1,540	18.69
1976	19.10	80.50	99.60	1,865	18.72
Fourth FYP					
1977	25.90	113.50	139.40	2,536	18.19
1978	38.30	157.10	195.40	3,466	17.74
1979	50.20	190.50	240.70	4,300	17.86
1980	50.00	195.70	245.70	4,436	18.05
1981	56.20	212.50	268.70	5,005	18.63
Fifth FYP					
1982	64.60	217.40	282.00	5,196	18.43
1983	78.00	237.70	315.70	5,615	17.79
1984	87.60	254.30	341.90	5,916	17.30

Source: KNR/Bank.

KOREA

RAILWAYS VII (LOAN 1836-KO)

PROJECT COMPLETION REPORT

KNR Selected Operating Statistics (1975-83)

	1975	1976	1977	1978	1979	1980	1981	1982	1983
SYSTEM (at end of year)									
Route Length (km)	3,144	3,144	3,142	3,153	3,158	3,135	3,121	3,121	3,117
Standard gauge (1,435 m)	3,096	3,097	3,095	3,106	3,111	3,088	3,074	3,074	3,070
Narrow gauge (0.762 m)	47	47	47	47	47	47	47	47	47
Double track	561	567	602	607	607	720	714	714	714
Electrified	402	402	419	419	419	429	429	429	428
Number of stations	566	566	571	590	583	585	586	588	576
Average distance between stations (km)	5.56	5.56	5.50	5.44	5.42	5.36	5.33	5.31	5.41
STAFF (at end of year)									
Number of Employees	39,560	39,293	40,017	40,377	40,186	40,034	40,533	40,431	39,357
Permanent	33,748	33,481	33,266	33,685	33,492	33,477	34,526	34,379	33,586
Temporary	5,807	5,812	6,751	6,692	6,694	6,557	6,007	6,052	5,771
ROLLING STOCK /a									
Diesel Locomotive, Main Line									
In fleet (no.)	300	330	329	330	348	353	367	372	368
Available (no.)	260	385	286	291	312	316	328	340	331
Available (%)	86.7	86.4	86.9	88.2	89.7	89.5	89.4	91.2	89.9
Diesel Locomotive, Shunters									
In fleet (no.)	41	41	57/b	56	56	62	57	59	71
Available (no.)	39	36	48	49	49	52	51	53	63
Available (%)	95.1	87.8	84.2	87.5	87.5	83.9	89.4	89.8	88.7
Electric Locomotive, Main Line									
In fleet (no.)	66	65	81	89	90	90	90	90	90
Available (no.)	56	55	69	80	81	81	80	81	76
Available (%)	84.8	84.6	85.2	89.9	90.0	90.0	88.9	90	84.4
Diesel Railcars, Powered Units									
In fleet (no.)	119	123	120	119	118	123	119	126	124
Available (no.)	86	98	90	94	97	103	98	110	111
Available (%)	72.3	79.7	75.0	79.0	82.2	83.7	82.4	87.3	89.5
Electric Railcars, Powered Units									
In fleet (no.)	126	126	135	193	235	279	328	340	340
Available (no.)	110	114	118	173	209	223	297	307	309
Available (%)	87.3	90.5	87.4	89.6	88.9	80.0	90.5	90.3	90.9
Passenger Cars, Including Railcar Trailers									
In fleet (total no.)	1,712	1,760	1,803	1,765	1,794	1,858	1,993	2,149	2,146
Airconditioned coaches	65	71	70	101	141	228	305	391	402
Other coaches	1,293	1,335	1,378	1,295	1,323	1,300	1,350	1,437	1,446
Sleeping cars	27	29	31	36	35	35	32	33	33
Restaurant cars	26	24	21	21	23	23	27	27	25
Baggage cars	122	117	120	127	153	152	145	140	124
Railcar trailers	146	144	141	141	60	60	60	60	60
Other	33	40	42	44	59	60	74	61	56
Available (no.)	1,515	1,559	1,612	1,610	1,635	1,690	1,810	1,994	1,989
Available (%)	88.5	88.7	89.4	91.2	91.1	91.0	90.8	92.8	92.7

	1975	1976	1977	1978	1979	1980	1981	1982	1983
Freight Cars									
In fleet (total no.) (including privately-owned cars)	15,794	15,964	16,134	15,710	16,205	16,858	16,583	16,339	16,159
Box cars	4,993	5,096	5,009	4,790	4,973	5,236	5,151	4,948	4,758
Gondolas	6,380	6,548	6,662	6,579	6,713	7,207	6,870	6,824	6,948
Flat cars	1,572	1,416	1,133	1,166	1,148	1,141	1,156	1,127	1,097
Tank cars	2,266	2,379	2,489	2,621	2,687	2,736	2,758	2,817	2,739
Others	583	525	841	554	684	684	648	623	617
Available (no.)	14,358	14,259	14,769	14,627	15,233	15,816	15,485	15,383	15,313
Available (%)	90.9	89.3	91.5	93.1	94.0	93.8	93.4	94.2	94.8
In fleet (privately-owned)	1,422	1,445	1,518	1,542	1,607	1,656	1,700	1,720	1,659
TRAFFIC									
Passenger Traffic									
No. of Passengers (Total, mln)	221.0	248.7	301.6	371.0	423.7	430.8	441	443.5	469.4
Seoul suburban (SMESRS)	82.4	100.1	139.4	195.4	240.7	245.7	268	282	315.7
Other	138.6	148.5	162.2	175.6	183.0	185.1	173	161.5	153.7
Passenger-Km (mln)	12,926	14,305	17,099	20,054	20,386	21,640	21,551	21,034	21,688
Seoul suburban (SMESRS)	1,540	1,865	2,536	3,466	4,300	4,436	4,998	5,196	5,615
Other	11,386	12,440	14,563	16,588	17,086	17,204	16,553	15,838	16,073
Average Journey (Total)	56.5	57.5	56.7	54.1	50.5	50.2	48.9	47.4	46.2
Seoul suburban (SMESRS)	18.7	18.6	18.2	17.7	17.9	18.0	18.6	18.4	17.8
Other	82.2	83.7	89.8	94.5	93.4	93.0	95.8	98.1	104.6
Freight Traffic									
Net ton ('000)	42,758	43,630	47,631	49,654	50,879	49,009	48,800	47,500	50,500
Net ton-km (mln)	9,293	9,728	10,509	10,926	11,081	10,798	10,815	10,892	11,629
Average freight haul	217	223	221	220	218	221	222	229	230.3
Traffic units (mln)	22,219	24,033	27,608	30,980	32,467	32,438	32,366	31,926	33,317
Traffic Density									
Passenger-km per route km ('000)	4,111	4,550	5,442	6,360	6,772	6,903	6,905	6,740	6,958
Freight net ton-km per route km ('000)	2,956	3,094	3,345	3,465	3,509	3,444	3,465	3,489	3,731
Traffic units per route km ('000)	7,067	7,644	8,787	9,826	10,281	10,347	10,370	10,229	10,689
OPERATIONS									
Train-Km ('000)	51,022	55,393	58,217	61,376	64,103	65,319	67,245	69,193	71,477
According to Types of Train									
Passenger (incl. railcars)	31,123	34,807	36,905	39,157	41,553	43,293	45,292	47,632	48,637
Freight	19,899	20,586	21,312	22,219	22,550	22,026	21,953	21,561	22,839
According to types of traction									
Diesel locomotive	37,876	41,326	42,780	43,800	45,562	46,465	48,384	50,217	53,232
Electric locomotive	5,336	5,475	6,719	7,443	7,386	7,185	7,038	7,051	7,159
Diesel railcar	4,380	4,662	4,283	4,066	4,055	4,296	4,072	4,190	4,216
Electric railcar	3,361	3,885	4,403	6,062	7,099	7,373	7,736	7,734	6,870
Engine-Km, excluding Shunting									
Diesel locomotives	39,870	43,324	45,040	45,984	48,789	49,654	51,055	61,251	64,184
Electric locomotives	6,242	6,509	8,306	9,388	9,442	9,318	9,339	9,279	9,688
Diesel railcars	10,647	11,641	10,563	10,873	10,667	11,890	12,326	12,903	12,972
Electric railcars	20,164	23,307	26,426	36,357	42,107	43,131	55,046	56,754	55,176
Rolling Stock-Km (mln)									
Passenger cars, total	241	265	287	315	340	356	389	408	428
Freight cars, total	385	402	430	444	452	435	430	431	463
Loaded	219	226	245	251	252	245	262	263	281
Empty /c	166	176	185	193	200	190	168	168	182
Loaded freight cars forwarded ('000)	966	972	1,052	1,089	1,102	1,050	1,046	1,012	1,075
Average freight car turnaround time (days)	5.4	5.4	5.1	4.9	5.0	5.0	4.8	4.8	4.76
Average freight car turnaround distance (m)	399	414	409	408	410	414	411	426	436

	1975	1976	1977	1978	1979	1980	1981	1982	1983
PERFORMANCE INDICATORS									
Passenger Traffic									
Average no. of passengers per passenger train	415	411	463	512	515	500	476	442	446
Average no. of passengers per passenger car	53.6	54.0	59.6	63.7	62.9	60.8	55.4	51.6	50.7
Freight Traffic									
Average no. of freight cars per freight train	19.3	19.5	20.2	20.0	20.0	19.8	19.6	20.0	20.3
Loaded	11.0	11.0	11.5	11.3	11.2	10.9	11.9	12.2	12.3
Empty /c	8.3	8.5	8.7	8.7	8.8	8.9	7.7	7.8	8.0
Average freight train load (net tons)	467	472	493	492	491	490	493	505	509.2
Average load per loaded freight car (net tons)	44.6	44.9	45.3	45.6	46.2	46.7	41.3	41.4	41.4
Staff									
Traffic units per employee ('000)	561	612	690	767	808	810	799	790	846.5
Employees per route-km	12.6	12.5	12.7	12.8	12.7	12.8	13.0	13.0	12.6
Rolling Stock									
Availability (%)									
Diesel locomotives, main line	86.7	86.4	86.9	88.2	89.7	89.5	89.4	91.2	89.9
Electric locomotives	84.8	84.6	85.2	89.9	90.0	90.0	88.9	90.0	84.4
Diesel railcars, powered units	72.3	79.7	75.0	79.0	82.2	83.7	82.4	87.3	89.5
Passenger cars	88.5	88.7	89.4	91.2	91.1	91.0	90.8	92.8	92.7
Freight cars	90.9	89.3	91.5	93.1	94.0	93.8	93.4	94.2	94.8
Yearly Distance Covered Per Available Unit ('000 km)									
Diesel main line	153	152	157	158	156	157	156	180	193.9
Electric main line locomotives	111	118	120	117	117	115	117	115	127.5
Diesel railcars	123	119	117	108	110	115	126	117	116.9
Electric railcars	183	204	224	210	201	193	185	185	178.6
Passenger cars	159	170	178	196	210	211	220	205	215.2
Freight cars	26.8	28.2	29.1	30.4	29.7	27.5	28	28	30.2
Passenger-km per available passenger car, including rail cars ('000)	7,528	8,077	9,034	10,684	11,018	12,805	9,773	8,724	9,002.0
Net ton-km per available freight car ('000)	647	682	712	747	727	683	698	708	759.0

/a Number of fleet is average of number at beginning and end of year. Available number is average number during year.

/b 16 line locomotives transferred to shunters.

/c Including cabooses.

KOREA

RAILWAY VII (Loan 1836-KO)

Porject Completion Report

Consolidated Income Statement (1977-84)

(Won billion)

		1977 Audited	1978 Audited	1979 Audited	1980 Audited	1981 Audited	1982 Audited	1983 Audited	1984 Actual
Traffic (traffic units = billion)	A			-	35.50	38.90	42.00	45.20	47.90
	B	27.61	30.98	32.50	32.40	32.40	31.90	33.32	35.11
Operating revenue	A			-	316.20	421.90	506.20	604.90	684.70
	B	134.30	166.10	208.40	280.60	356.90	417.30	470.92	524.45
Working cost	A			-	258.20	321.90	387.00	459.80	520.80
	B	119.30	142.80	182.50	253.00	318.50	381.80	418.07	441.68
Depreciation	A			-	24.90	29.50	34.60	39.90	44.90
	B	17.30	20.50	26.10	28.70	43.60	51.30	57.97	64.60
Total operating costs	A			-	283.10	351.40	421.60	499.70	565.70
	B	136.60	163.30	208.60	281.70	362.10	433.10	476.04	506.28
Net operating revenue (loss)	A			-	33.10	70.50	84.60	105.20	119.00
	B	-2.30	2.80	-0.20	-1.10	-5.20	-15.80	-5.12	18.17
Net nonoperating revenue (loss)	A			-	1.30	1.50	1.60	1.80	1.90
	B	-1.40	-0.70	5.00	9.00	2.40	11.40	5.93	6.00
Interest charges	A			-	40.60	51.70	64.60	75.90	86.10
	B	16.30	23.80	29.70	48.60	60.10	69.90	72.46	76.72
Net income (loss)	A			-	-6.20	20.30	21.60	31.10	34.80
	B	-20.00	-21.70	-24.90	-40.70	-62.90	-74.30	-71.65	-52.55
Exchange loss (profit)	A				3.70	3.60	4.00	4.20	4.10
	B								
Government subsidy against operating losses	A			-	25.80	0.00	0.00	0.00	0.00
	B	21.70	21.40	31.90	5.00	0.00	34.80	35.40	55.50
Book profit (loss)	A			-	15.90	16.70	17.60	26.90	30.70
	B	1.70	-0.30	7.00	-35.70	-62.90	-39.50	-36.25	2.95

Notes: Line A = Appraisal forecasts.
Line B = Audited through 1983; actual for 1984.

[illegible]

RAILWAY VII (Line [illegible])

Project Completion Report

Unit Traffic Revenue and Cost - 1980

	Traffic (MU/KM billion)	Gross Operating Revenue			Total cost	Operating Cost			Net operating revenue	Interest charges	Net revenue	Gross Operating Revenue			Unit Cost							Cost Coverage				
		Direct	Indirect	Total		Total	Variable Cost (Z)	Amount	Fixed cost						Total unit cost	Operating Cost			Net operating revenue	Interest charges	Net revenue	Total rev./Total oper.cost	Operating		Interest charges/Net oper.rev.	Total
							(Mun'000)									Total (Mun)	Variable	Fixed (U)					Variable	Fixed		
Passenger																										
Express	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Int. Exp.(Air Cond.)	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Int. Exp.(Non Air Cond.)	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Ordinary	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Railway	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Commuter	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Subtotal: Intercity	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Rural Urban: Non commuters	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Commuters	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Subtotal: Passenger	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Baggage		[illegible]			[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]															
Total: Passenger and baggage		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]															
Freight																										
Oil	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Coal	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Grain	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Fertilizer	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Cement	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Sugar	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Empty car returns																										
Others	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Military	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Subtotal: Commercial freight	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
UIC	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Total: Freight	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Grand Total		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]															

Note: All figures are rounded.

Table 5.2

3

Table 5.3

KOREA

RAILWAY VII (Loan 1836-)

Project Completion Report

Cash Flow Statement (1977-84)

(Won billion)

		1977 Audited	1978 Audited	1979 Audited	1980 Audited	1981 Audited	1982 Audited	1983 Audited	1984 Actual
SOURCES OF FUNDS									
Cash Generated by KNR									
Gross operating revenue	A			-	316.20	421.90	506.20	604.90	689.70
	B	134.30	166.10	208.40	280.60	356.90	417.30	470.92	524.45
Less working expenses	A			-	258.20	321.90	387.00	459.80	520.80
	B	119.30	142.80	182.50	253.00	318.50	381.80	418.07	441.68
Subtotal-cash generated from operations	A			-	58.00	100.00	119.20	145.10	168.90
	B	15.00	23.30	25.90	27.60	38.40	35.50	52.85	82.77
Add loss on exchange fluctuations	A			-	-	-	-	-	-
	B	0.40		-	-	-	-	-	-
Provision for severance pay	A			-	-	-	-	-	-
	B	-0.50	3.00	2.40	3.20	3.20	4.10	3.17	-
Other nonoperating revenue	A			-	1.30	1.50	1.60	1.80	1.90
	B	-1.40	-0.70	5.00	0.00	2.40	11.40	5.93	6.00
Sale of assets	A			-	8.50	9.00	10.00	11.00	12.00
	B	3.10	2.60	0.90	10.60	10.90	11.70	21.34	-
Total cash generated by KNR	A			-	67.80	110.50	130.80	157.90	182.80
	B	16.60	28.20	34.20	41.40	54.90	62.70	83.29	88.77
Subsidies									
Government against operating losses	A			-	25.80	-	-	-	-
	B	21.70	21.40	31.90	5.00	0.00	34.80	35.40	55.50
Government for investments	A			-	22.20	61.40	48.80	35.20	39.20
	B	0.80	0.00	37.80	22.20	22.90	18.00	27.50	-
Other	A			-					-
	B								14.40
Total subsidies	A			-	48.00	61.40	48.80	35.20	39.20
	B	22.50	21.40	69.70	27.20	22.90	52.80	62.90	69.90
Borrowing									
Foreign	A			-	37.50	57.90	67.40	49.10	60.10
	B	25.00	25.30	41.20	23.70	29.50	25.90	19.52	16.27
Local	A			-	69.60	163.20	122.50	120.00	137.50
	B	24.00	35.00	46.20	92.80	92.10	94.00	76.23	113.88
Sale of bonds	A			-			-	-	
	B						49.60	25.00	
Total borrowing	A			-	107.10	221.10	189.90	169.10	197.60
	B	49.00	60.30	87.40	116.50	121.60	169.50	120.75	130.15
Grand total sources of funds	A			-	222.90	393.00	369.50	362.20	419.60
	B	88.10	109.90	191.30	185.10	199.40	285.00	266.94	288.82
APPLICATION OF FUNDS									
Investment	A			-	156.70	288.60	248.40	213.90	237.40
	B	65.40	59.70	133.10	158.30	138.00	155.90	144.44	155.16
Debt Service									
Interest	A			-	40.60	51.70	64.60	75.90	86.10
	B	16.30	23.80	29.70	48.60	60.10	69.90	72.46	76.72
Repayment	A			-	29.90	34.40	41.60	56.80	66.70
	B	15.00	19.50	20.00	36.40	35.60	42.40	42.88	44.69
Total debt service	A			-	70.50	86.10	106.20	132.70	152.80
	B	31.30	43.30	49.70	85.00	95.70	112.30	115.34	121.41
Grand total application of funds	A			-	227.20	374.70	354.60	346.60	390.20
	B	96.70	103.00	182.80	243.30	233.70	268.20	259.78	276.57
Annual variation in working capital	A			-	-4.30	18.30	14.90	15.60	29.40
	B	-8.60	6.90	8.50	-58.20	-34.30	16.80	7.16	12.25
Working capital brought forward	A			-	0.40	-3.90	14.40	29.30	44.90
	B	4.90	-3.70	3.20	11.70	-46.50	-80.80	-64.00	-56.84
Working capital at end of year	A			-	-3.90	14.40	29.30	44.90	74.30
	B	-3.70	3.20	11.70	-46.50	-80.80	-64.00	-56.84	-44.59

Notes: Line A = Appraisal forecasts.
Line B = Audited through 1983; actual for 1984.

Table 9.4

KENYA
RAILWAY VII (Loans 1635-KE)
Project Completion Report
Balance Sheet
(Ksh billion)

		1977 Audited	1978 Audited	1979 Audited	1980 Audited	1981 Audited	1982 Audited	1983 Audited	1984 Actual
ASSETS									
Current Assets									
Cash	A			-	-7.00	10.80	21.10	41.30	71.40
	B	6.80	8.70	8.90	10.40	8.10	14.10	18.49	18.24
Account receivable	A			-	17.40	20.60	23.60	27.60	29.90
	B	6.70	9.30	30.50	10.70	14.10	16.80	19.82	21.84
Inventories	A			-	40.70	49.40	27.30	66.90	75.80
	B	15.10	22.00	22.60	25.30	28.30	33.00	31.76	44.17
Other current assets	A			-	9.00	10.60	20.00	20.00	20.00
	B	1.20	2.90	5.60	7.10	3.60	7.40	6.87	7.87
Subtotal current assets	A			-	60.10	99.00	122.40	155.80	197.10
	B	29.20	42.90	68.00	54.70	54.10	71.30	76.94	95.64
Current Liabilities									
Accounts payable	A			-	21.00	25.60	30.70	36.30	41.30
	B	12.40	11.40	21.50	34.30	40.40	33.70	30.25	35.21
Current maturities	A			-	29.90	34.40	41.60	55.80	65.70
	B	15.90	19.90	21.00	32.10	38.40	41.30	42.89	44.69
Other current liabilities	A			-	13.10	24.40	20.80	17.80	19.60
	B	9.00	8.80	13.90	34.60	49.10	31.70	31.46	36.81
Suspense account'	A			-	-	-	-	-	-
	B			-		7.00	8.60	9.18	
Subtotal current liabilities	A			-	64.00	84.60	93.10	110.90	127.00
	B	32.90	39.70	56.40	101.20	134.90	139.30	133.78	136.71
Total net working capital	A			-	-3.90	-14.40	29.30	44.90	69.30
	B	-3.70	3.20	11.60	-46.50	-80.80	-64.00	-56.84	-44.59
Fixed Assets									
In use land	A			-	282.10	349.10	395.00	445.40	498.70
	B	225.30	234.30	428.40	423.70	479.00	592.10	654.05	-
In use other fixed assets	A			-	1115.80	1372.10	1566.60	1768.40	1987.90
	B	812.30	873.30	1022.60	1212.90	1708.60	2005.90	2204.08	-
Subtotal gross book value of fixed assets	A			-	1397.90	1721.20	1961.60	2213.80	2486.60
	B	1037.60	1107.80	1451.00	1636.20	2187.60	2596.00	2858.13	2961.69
Accumulated depreciation	A			-	266.40	290.00	317.70	349.60	389.90
	B	209.00	229.30	296.60	305.10	439.60	532.00	611.72	676.32
Subtotal net fixed assets in use	A			-	1131.50	1431.20	1643.90	1864.20	2101.10
	B	828.60	878.30	1194.40	1331.10	1748.00	2064.00	2246.41	2285.37
Working in progress	A			-	60.60	9.20	28.80	24.40	28.30
	B	18.00	38.40	75.80	134.80	113.10	133.40	195.19	207.99
Total net fixed assets	A			-	1192.10	1440.40	1672.70	1888.60	2129.40
	B	846.60	916.70	1270.20	1465.90	1861.10	2197.40	2402.60	2493.16
Other Assets									
Miscellaneous other assets	A			-	4.20	4.20	4.20	4.20	4.20
	B	3.20	3.30	3.40	9.60	9.80	15.40	19.43	19.43
Deferred loss on exchange fluctuations	A			-	31.20	31.20	31.20	31.20	31.20
	B	33.00	51.20	40.10	130.60	60.30	34.30	44.79	44.79
Total other assets	A			-	35.40	35.40	35.40	35.40	35.40
	B	36.20	54.50	43.50	136.20	70.10	67.90	64.22	64.22
Grand total assets	A			-	1243.60	1510.20	1737.40	1988.90	2254.30
	B	879.10	974.40	1325.30	1555.60	1850.40	2201.30	2409.98	2512.79
LIABILITIES									
Long-term Debt									
Loan capital	A			-	500.40	690.70	843.00	999.50	1094.50
	B	285.10	351.40	416.70	590.80	690.70	825.90	909.18	994.64
Provision for severance pay	A			-	8.00	8.00	8.00	8.00	8.00
	B	3.20	6.20	8.40	11.30	13.70	15.20	17.14	17.14
Total long-term debt	A			-	508.40	698.70	851.00	987.50	1102.50
	B	289.30	357.60	425.10	602.10	704.40	842.10	926.32	1011.78
Equity Equivalent									
Opening capital	A			-	61.50	61.50	61.50	61.50	61.50
	B	61.50	61.50	61.50	61.50	61.50	61.50	61.50	61.50
Subsidies for investment	A			-	79.30	120.90	169.70	204.90	244.10
	B	10.50	9.90	103.90	112.60	133.90	153.90	164.63	179.03
Revaluation reserve	A			-	997.00	632.00	673.10	724.10	779.50
	B	508.10	539.80	763.20	847.80	1077.00	1302.50	1420.80	1420.80
Accumulated surplus (loss)	A			-	-87.20	-107.30	-104.30	-73.50	-37.70
	B	-12.00	-51.20	-116.60	-162.10	-221.70	-286.80	-327.17	-379.72
Subsidies against operating losses	A			-	104.40	104.40	104.40	104.40	104.40
	B	21.70	56.80	88.70	93.70	93.70	128.50	163.50	219.40
Total equity equivalent	A			-	735.20	811.50	905.40	1021.40	1151.80
	B	589.80	616.80	900.30	953.50	1146.00	1359.20	1483.66	1501.01
Grand total liabilities	A			-	1243.60	1510.20	1737.40	1988.90	2254.30
	B	879.10	974.40	1325.40	1555.60	1850.40	2201.30	2409.98	2512.79

Notes: Line A = Appraisal forecasts.
Line B = Audited through 1983; actual 1984.

Table 7.1

KOREA

RAILWAYS VII (LOAN 1836-KO)

PROJECT COMPLETION REPORT

Economic Return on Capacity Increases for Freight Services

Year	Capital costs (W million) /a	Tarffic that would otherwise divert To other modes without project /b (million ton-km)	Net benefit stream (W million) /c
1980	6,319	-	(6,319)
1981	13,084	-	(13,084)
1982	12,997	-	(12,997)
1983	9,099	365	(1,799)
1984	501	635	12,199
1985-2007	-	850	17,000
			Rate of Return is 19%

/a Includes investment (in 1979 prices) in lines, motive power and rolling stock, new repair facilities, telecommunications and power.

/b This is taken conservatively as two thirds of the freight traffic increase. The remaining traffic increase is assumed to be handled by improvement in use of existing facilities.

/c Difference (in 1979 prices) between transport cost by rail and the least costly alternative. This is generally road transport since coastal shipping is only competitive for traffic with origins and destinations at or near ports and this has already been taken into account when forecasting railway traffic. An average of W 20 per ton-km is assumed as the cost difference. This assumes a terminal cost for rail operations of W 1,200 per ton, and a road cost which is a weighted average of heavy truck costs on paved and gravel roads (3/4 paved and 1/4 gravel).

Table 7.2

KOREA

RAILWAYS VII (LOAN 1836-KO)

PROJECT COMPLETION REPORT

Financial Return on Capacity Increases for Passenger Services

Year	Capital Cost /a (W million)	Passenger increase Limited express AC (million pass.-km)	Passenger increase Limited express non-AC (million pass.-km)	Operating Profits /b Limited express AC (Won million)	Operating Profits /b Limited express non-AC (Won million)	Total
1980	11,049	-	-	-	-	(11,049)
1981	19,553	-	-	-	-	(19,553)
1982	14,938	170	191	1,190	764	(12,984)
1983	11,037	545	887	3,815	3,548	(3,674)
1984	1,244	1,030	1,154	7,210	4,616	10,582
1985-2007	-	1,200	1,300	8,400	5,200	13,600
						Rate of return is 14%

/a Includes investments in lines, motive power and rolling stock, new repair facilities, telecommunications and power.

/b Difference between total operating costs and revenues, i.e.,
Special express..... 9 Won/pass.-km
Limited express, air conditioned..... 7 Won/pass.-km
Limited express, non air conditioned... 4 Won/pass.-km

Table 7.3

KOREA

RAILWAYS VII (LOAN 1836-KO)

PROJECT COMPLETION REPORT

Economic Return on Capacity Increases for Seoul Surburban Services

Year	Capital costs /a (W million) Line	Railcars	Total	Traffic that would divert to buses without project (million pass.-km)	Economic cost savings from alternative mode /b (W billion)
1978	3,516	-	3,516	-	-
1979	8,254	-	8,254	-	-
1980	13,599	19,333	32,932	-	-
1981	4,528	-	4,528	-	-
1982	2,104	-	2,104	-	-
1983	241	-	241	-	-
1984	-	2,250	2,250	1,000	3.75
1985	-	-	-	2,000	12.00
1986-2007	-	-	-	2,685	16.10
					Rate of return is 16%

/a Includes investment for the entire quadrupling of the Seoul-Suweon line, started under the sixth project and completed under this project, and the electric railcars acquired.

/b Difference between cost by rail and cost by bus. This is conservative as, without the project, some trips may divert to taxis and cars at higher costs. Cost by urban buses in Seoul were some W 10/passenger-km while costs by SMESRS were W 4/passenger-km.

ANNEX

BORROWER COMMENTS

2CZC DIST0578 WUI888
OEDOD
REF : TCP FCA

APR 28 1986

WUI888
HMT2839 KWU978
UWWA HL KRSE 052
SEOUL 52 28 1905

LT
INTBAFRAD WASHINGTON DC.

FOR MR YUKINORI WATANABE DIRECTOR OF OPERATIONS EVALUATION DEPARTMENT
RE: YOUR LETTER OF FEBRUARY 18, 1986 REGARDING PROJECT COMPLETION REPORT ON KOREA SEVENTH REALLWAY PROJECT UNDER LOAN 1836-KO WE ARE PLEASED TO INFORM YOU THAT WE HAVE NO COMMENTSS TO TO MAKE ON THE SAID REPORT REGARDS KNR SEOUL

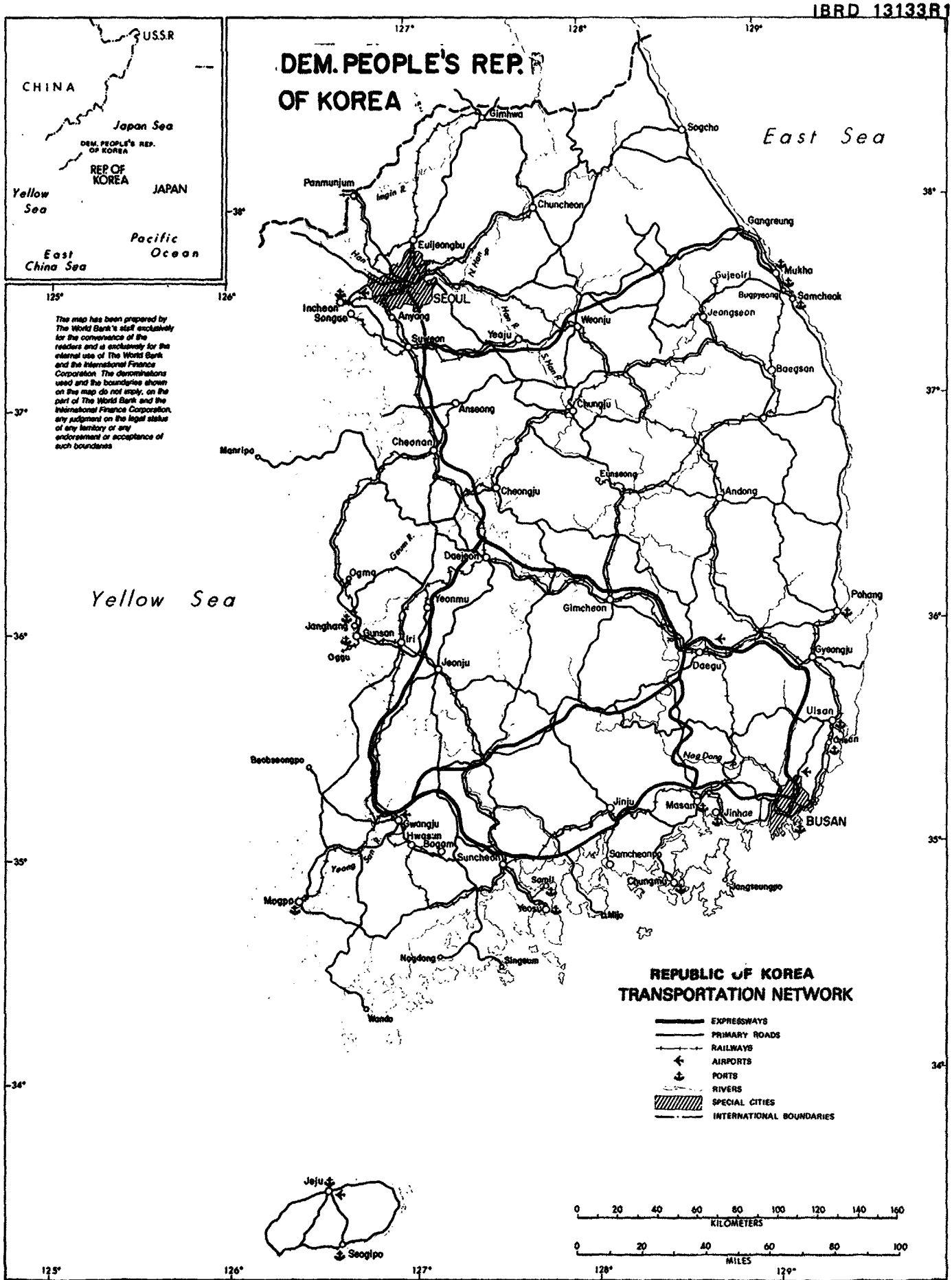
COL LT 18 1986 1836-KO

046311 1202 280486
01710171 888

=04280838

ALT RTD FROM:OEDM

NNNN



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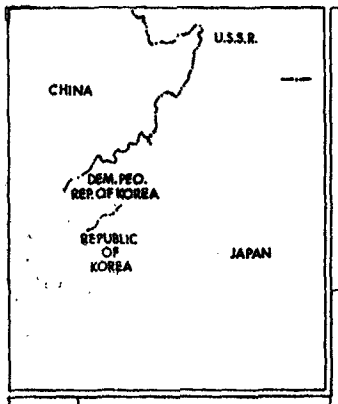
MARCH 1985

IBRD 13134 R1
FEBRUARY 1983



DEMOCRATIC PEOPLE'S REPUBLIC OF KOREA

127° 128° 129°

38° 37° 36° 35° 34°

SINTANRI
MUNSAN
CHUNCHEON
EUIJEONGBU
NEUNGGOG
KIMPO
SEONGBUG
CHEONGYANGRI
DANGINRI
SEOUL
YONGSAN
YEONGDEUNGPO
INCHEON
SONGDO
SUWEON
WEONJU
GYEONGPODAE
MUKHO
BUGPYEONG
SAMCHEOG
GUJEOLRI
SAMHWA
JEUNGSAN
YEONGWEOL
BAEGSAN
BONGYANG
JECHEON
GONGJEON
ANSEONG
CHEONAN
JOCHIWEON
MUN GYEONG
GAEUN
JEOMCHON
ANDONG
YEONGJU
NAMPO
OGMA
DAEJEON
GIMCHEON
CHAEUN
YEONMUDAE
JANGHANG
GUNSAN
IRI
OGGU
JEONJU
POHANG
GWEDONG
HYOJA
YEONGCHEON
GYEONGJU
DONGDAEGU
ULSAN
ONSAN
NAMCHANG
SAMRANGJIN
GHANGWEON
MASAN
JINHAE
BUSAN
JINJU
DAEYANG
SAMCHEONPO
SONGJEONGRI
GWANGJU
HWASUN
BOGAM
SUNCHEON
MOGPO
BOSEONG
YEOSU

SEE "SEOUL METROPOLITAN AREA NETWORK" MAP

GYEONG WEON LINE
GYEONG EUI LINE
GYEONG CHUN LINE
GYEONG IN LINE
JUNG ANG LINE
SU IN LINE
GYEONG BU LINE
AN SEONG LINE
CHUNG BUG LINE
JANG HANG LINE
NAMPO LINE
MUN-GYEONG LINE
GAEUN LINE
GANG GYEONG LINE
GUN SAN LINE
OGGU LINE
JEON RA LINE
HO NAM LINE
GYEONG JEON LINE
JIN SAM LINE
BUGPYEONG LINE
JEONG SEON LINE
SAM CHEOG LINE
TAE BAEG LINE
YEONG DONG LINE
DAE GU LINE
GYEONG BU LINE
DONG HAE NAM BU LINE
ONSAN LINE
GWEONG LINE

Yellow Sea

MAIN LINES

GYEONG BU LINE	Seoul-Busan
JUNG ANG LINE	Cheongyangri - Gyeongju
GYEONG IN LINE	Yeongdeungpo - Incheon
JANG HANG LINE	Cheonan - Janghang
CHUNG BUG LINE	Jochiweon - Bongyang
GYEONG BUG LINE	Gimcheon - Yeongju
DAE GU LINE	Daegu - Yeongcheon
GYEONG EUI LINE	Seoul - Munsan
GYEONG WEON LINE	Yongsan - Sintanri
GYEONG CHUN LINE	Seongbug - Chwncheon
HO NAM LINE	Daejeon - Mogpo
JEON RA LINE	Iri - Yeosu
DONG HAE NAM BU	Busanjin - Pohang
TAE BAEG LINE	Jecheon - Baegtan
YEONG DONG LINE	Yeongju - Gyeongpodae

UNECONOMIC LINES

SU IN LINE	Suweon - Songdo
JIN SAM LINE	Gaeyang - Samcheonpo
AN SEONG LINE	Cheonan - Anseong
OG GU LINE	Gunsan - Oggu
HWA SUN LINE	Hwasun - Bogam
KIM PO LINE	Yongsan - Kimpo
YONG SAM LINE	Yongsan - Dangjinri

REPUBLIC OF KOREA
TRANSPORT SECTOR
NATIONAL RAILROAD NETWORK

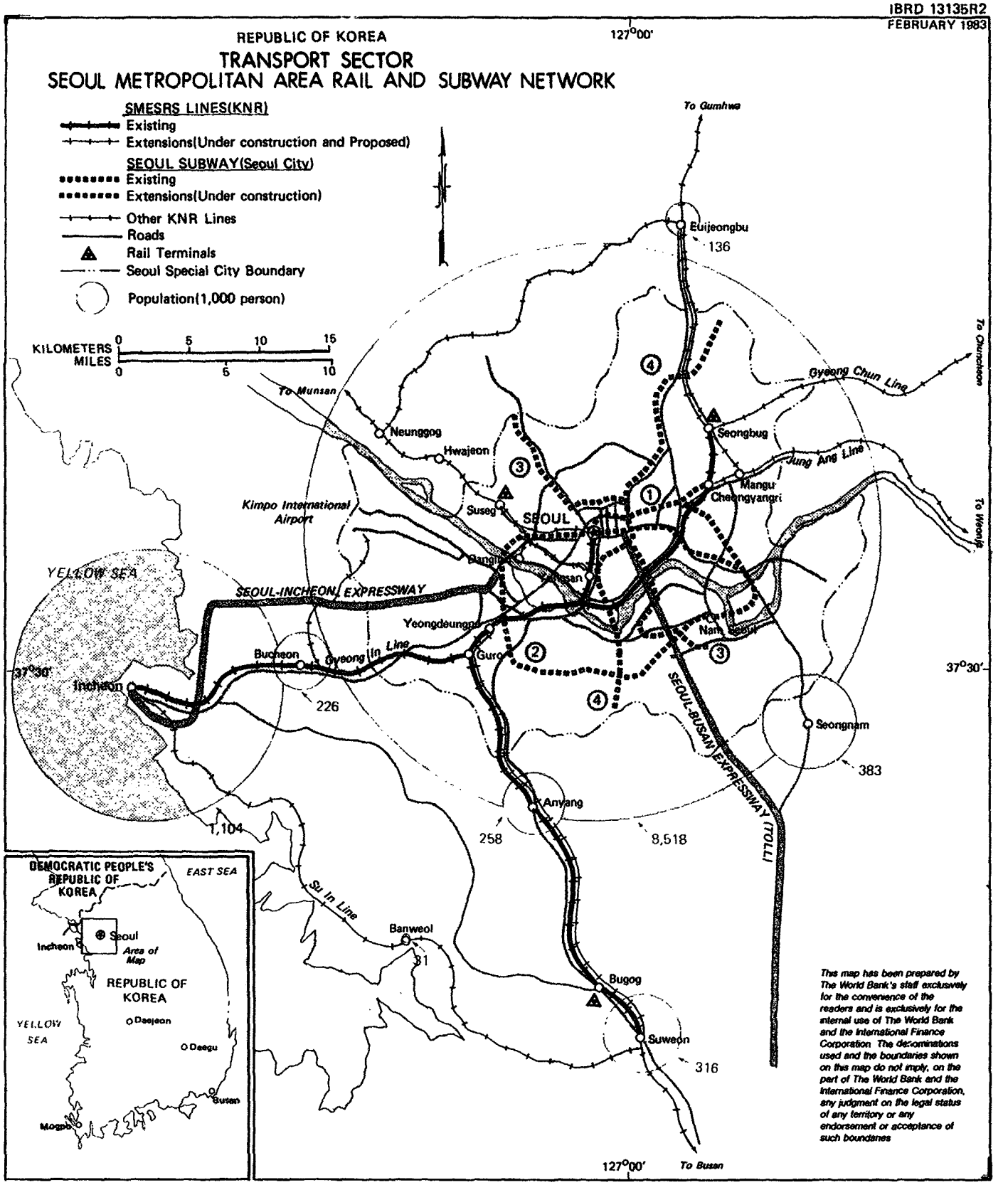
- DOUBLE TRACK LINES
- SINGLE TRACK LINES
- DOUBLE TRACK UNDER CONSTRUCTION
- ELECTRIFIED LINES
- UNECONOMIC LINES
- MAJOR STATIONS
- INTERNATIONAL BOUNDARIES

KILOMETERS 0 20 40 60 80 100
MILES 0 20 40 60 80

IBRD 13135R2
FEBRUARY 1983

REPUBLIC OF KOREA

TRANSPORT SECTOR
SEOUL METROPOLITAN AREA RAIL AND SUBWAY NETWORK



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